AFIT/GLM/LSY/93S-19



AD-A274 016



ANALYSIS AND DEVELOPMENT OF AN F-5 POLLUTION PREVENTION MANAGEMENT PROGRAM WITH RECOMMENDATIONS FOR CREATION OF SIMILAR PROGRAMS FOR OTHER AIRCRAFT

THESIS

Janice M. Gavern, GS-13, Capt, USAFRes

AFIT/GLM/LSY/93S-19

Approved for public release; distribution unlimited

93-30663

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

Accesio	n For		7				
NTIS CRA&I DTIC TAB U announced J wification							
By							
	vanability 						
Di∴t	Avaii a opac						
A-1							

DTIC QUALITY INSPECTIVED A

ANALYSIS AND DEVELOPMENT OF AN F-5 POLLUTION PREVENTION MANAGEMENT PROGRAM WITH RECOMMENDATIONS FOR CREATION OF SIMILAR PROGRAMS FOR OTHER AIRCRAFT

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Logistics Management

Janice M. Gavern, B.S.

(Captain, USAFRes)

September 1993

Approved for public release; distribution unlimited

Acknowledgments

No one can accomplish the monumental task of conducting and documenting thesis research without the help and support of numerous individuals. A list of everyone who has supported this effort would be longer than the thesis itself, however, there are some individuals who deserve special recognition:

Richard "Brett" Andrews, my advisor, supporter, and sounding board, whose Acquisition Logistics course sparked my interest in that area. Brett, you are a logistician without equal in my books!

Lt Col Shishoff, my primary advisor, and the only instructor at AFIT able to make even the Federal Budget process interesting!

Bill McCutcheon, and all of my friends and colleagues at the Proven Aircraft

Division, San Antonio Air Logistics Center, Kelly AFB, Texas. Thanks for letting me run
with this project!

My friends, and colleagues in Aeronautical Systems Center, Acquisition Logistics,
Development Planning, Program Development, and Environmental Management Program
Offices. I could never have gotten to, and through, AFIT without you!

My friends and colleagues in Armstrong Laboratories, particularly Craig Armdt, and in Human Systems Center, Air Force Material Command, and Headquarters, USAF, especially Lt Col Richard Drawbaugh, and Major Brian McCarty. The vision of hazardous material management in the Air Force created by Lt Col Drawbaugh and Major McCarty, and the obvious depth of their care and concern for the environment, has been my inspiration these past few years.

My friends and colleagues in the United States Air Force Reserve. For 25 years you have taught me what patriotism, dedication and professionalism are all about. I salute you!

and

My family and friends - every last one of you, here and gone: my Grandparents, brothers, aunts, uncles, cousins, and extended family - but particularly my Mom, Jeanne Gavern, and my Dad, Nicholas Gavern, for their love, and support - even if they still don't know what it is I do for a living!

Finally, to my darling, irascible, incredible, wonderful daughter, Lisa Jeanne Goodman. I dedicate this thesis to you, in the hope that it will help make the Earth your children inherit a better place in which to live. Love, Mom.

Janice M. Gavern

Table of Contents

		Page
Acknowledgments		. ii
List of Figures	•	· vii
List of Tables		.viii
Abstract	•	· ix
I. Introduction	•	. 1
General Issue		
Primary Research Objectives		
Thesis Scope	•	. 5
II. Background Review	•	. 7
National Policy		
Federal Law		
The Pollution Prevention Act of 1990		
The Clean Air Act Amendment of 1990		
U.S. Environmental Protection Agency Policy		
The 33/50 Program		
International Agreements		
The Montreal Protocols		
The United Nations Conference on Environment and Developmen		
Air Force Environmental Policy.	•	. 10
Pollution Prevention Program Action Plan	•	. 13
Air Force Pollution Prevention Management Program -		. 13
Action Memorandum		•
Air Force Ban on Purchase of Ozone Depleting Chemicals -		
Action Memorandum		
National Security		
Foreign Policy		
Security Assistance		
The Air Force Security Assistance Program		
International Logistics		
Total Package Approach	•	. 18
San Antonio Air Logistics Center Proven Aircraft Division .		
F-5 Program		. 18

			Pa	ge
III. Methodology	•		•	20
Identification of Problem Processes, Chemicals, and Materials.				20
Initial Technical Order Identification and Detailed Review				20
Creation of Spreadsheet Data Base				21
Sort of Data Base by Management Category				22
Soft of Data Dase by Management Category	•	•	•	22
Creation of the F-5 Pollution Prevention Program				23
Strategy for Management				24
F-5 Pollution Prevention Plan		•		24
Integrated Product Team				25
Alternatives				25
Decision Implementation				26
Updates and Revisions				28
	•	•	•	20
Systems Analysis of F-5 HAZMAT Minimization Process				28
IDEF _o		-		28
	•	•	•	20
IV. Utility of This Research to Generic Pollution Prevention Program	ns		•	35
General Utility				35
Applicability	•	•	•	35
To the Navy F-5 Program				35
To T-38 Aircraft	•	•	•	36
To Other Aircraft Managed by the Proven Aircraft Division	•	•	•	36
To Other Security Assistance Program Aircraft				36
10 0 1101 000 110 110 110 110 110 110 1	•	•	•	50
V. Recommendations	_	_	_	37
	•	•	•	J.
HAZMAT Crossfeed of Information				37
"Green" Accounting System				37
Decision Making Criteria and Tools				38
	•	•	•	-
VI. Conclusions	ъ .	•	•	39
Evaluation of Research Objective No. 1				39
Evaluation of Research Objective No. 2	•	•	•	39
Evaluation of Research Objective No. 3				39
Conclusion	• •	•	• •	40
Appendix A: F-5 Pollution Prevention Plan	, ,	•	•	44
Appendix B: F-5 Technical Order Data Base for Hazardous Materials.			. (94

																									,	age
Appendix C:	Defi	initi	ion	S	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	127
Appendix D:	Acr	ony	ms	.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	129
Bibliography		•	•	•	•	•	•			•	•		•		•		•	•		•				•	•	132
Vita		•															•	•	•	•	•					141

List of Figures

Figure	Page
1. F-5 Aircraft	4
2. The Goal: Consider, Make and Implement Decisions (A-0)	29
3. The F-5 Pollution Prevention Management Process (A-1)	30
4. Develop the F-5 Pollution Prevention Program (A-1-1)	31
5. Make HAZMAT Decisions (A-1-2)	32
6. Implement HAZMAT Decisions (A-1-3)	33
7. Update the Logistics System (A-1-3-2)	34

List of Tables

Tab	le						Page
1.	F-5 Technical Coordination Program Member Countries	•	•	•	•	•	19
2.	Environmental Protection Agency List of 17 Industrial Toxics						22

Abstract

This study developed a pollution prevention management program for the F-5 aircraft, and described its utility and applicability as a generic framework for similar programs. A representative set of F-5 technical orders was analyzed by hand, and the identified chemicals, materials, and processes were loaded into a spreadsheet data base for additional analysis. The Environmental Protection Agency (EPA) list of 17 targeted industrial chemicals, and other lists of ozone depleting chemicals (ODCs) were used as criteria to identify, for minimization, reduction, or elimination from use on the F-5, a hazardous material (hazmat) subset of those chemicals and materials which had already been identified. The identified hazmat substances were then "rolled-up" into an F-5 Pollution Prevention Management Plan. Program management use and implementation of the information set out in such a plan were also described. Recommendations for additional research and development, and for required tools were included. Finally, actual examples of all of the material created were attached to the document.

Analysis and Development of an F-5 Pollution Prevention Management Program With Recommendations for Creation of Similar Programs for Other Aircraft

I. Introduction

General Issue

In the last twenty years, our knowledge of environmental problems has reached a global perspective. At the same time, we are only beginning to understand the concept of global environmental health. Concerned citizens and Environmental Protection Agency (EPA) personnel are not the only ones who are upset and determined to do something about it. (25; 82:181-188; 92) The Department of Defense (DoD) has identified 10,924 hazardous hot spots at 1,877 installations, including 123 of the Superfund's 1,236 sites (100:69). The cost to clean up the mess has been estimated as much as '\$120 billion' (100:69). Other problems have occurred when military bases were selected for closure, and the problems of transferring the land to civilian uses were blocked or delayed because of pollution and the cost and time necessary for cleanup (79:770-772).

The problem is not limited to our country alone. A 1991 Air Force report estimated \$100 million to clean up 39 bases in 11 foreign nations. In Canada alone, it will cost more than \$61 million...it will cost \$42.3 million to restore just three bases in Germany (84:29). In his article "Toxic Military", Peto Pieth, a Swiss journalist, points out that the world's armed forces are the single biggest polluters on the planet (80:773).

Section 101 (c) of the Clean Water Act (95) states that:

It is further the policy of Congress that the President, acting through the Secretary of State and such national and international organizations as he determines appropriate, shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction and elimination of pollution in their waters and in international waters and for the achievement of goals regarding the elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws. (95)

In addition, recent scientific evidence has shown unmistakable damage to the ozone layer that protects the earth from harmful ultraviolet rays. The hole in the ozone layer now exposes inhabited areas to the potentially damaging sunlight. The impact of this occurrence may never be completely understood. (37:24-32)

Finally, everyone from CEOs, agency heads, generals, and commanders, to key managers, supervisors and individuals are concerned about the possibility of being prosecuted for environmental crimes and criminal liability (59:131).

The result of all of the problems described above is a new interest and concern for environmental protection and pollution prevention. (82:181-188)

Specific Problem

One significant goal of the Air Force is the reduction of hazardous waste at its source.

(69) In the case of the Air Force, the source is the aircraft. Numerous efforts are underway to accomplish that goal for the active duty Air Force. Unfortunately, similar efforts are not underway for weapons systems which are no longer in the active inventory, but which the U.S. government has sold to foreign countries (101). In addition, Air Force Regulation 19-15 (27) would require that offices that transfer or sell any Air Force developed technology or products which depend on ODCs must notify the Air Staff of any transaction which transfers dependence outside the Air Force (68:13).

At the time this thesis research was undertaken, there were not any Air Force weapon system Pollution Prevention Management Programs in place which had not been

accomplished by a contracted effort. Although I am still not aware of any such programs, there may be some underway which have not yet been reported. My goal was to determine if it was possible to develop such a program without a contractor, using government resources, and searching the technical orders by-hand. If it was, I would create the program, together with the products which would be necessary to implement it. I chose the F-5 aircraft (Figure 1) as my test case because, as an aircraft maintenance officer in the Category B Air Force Reserve program, I am assigned to the organization at San Antonio Air Logistics Center which provides logistics support for the F-5. In addition, the products, processes and technology used in maintaining the F-5 are common to a number of Air Force weapon systems, making crossfeed of information more important and relevant. Finally, a Pollution Prevention Management Program would demonstrate the capability to provide our allies with information on approved alternatives to required hazardous materials to support their own environmental protection programs.

Primary Research Objectives

Various models of the F-5 aircraft are flown by countries which are allies of the United States. A significant amount of documentation is readily available for the F-5 through the Proven Aircraft Division, San Antonio Air Logistics Center, Kelly AFB, Texas. This thesis effort used some of that documentation as the basis for an analysis of hazardous and toxic materials as they are required on the F-5 today.

Once the analysis was accomplished, a preliminary risk analysis was conducted on the identified materials. The identified chemicals and materials were grouped into management categories, with an identified chemical or material which is tracked in more than one system (explosive as well as hazardous, for example) at the top of the list, and those chemicals and materials which have not been identified as a hazard (petrolatum, for example) at the bottom of the list. As more chemicals and materials are identified, further groupings within these management categories will be accomplished. This next level of



igure 1. F-5 Aircraft

grouping will be based on the actual risk analysis of the chemicals and materials, and will also include operational and maintenance processes which use the chemicals and materials. This analysis will be conducted by personnel assigned to San Antonio Air Logistics Center, Materials Engineering Section, of the Technology and Industrial Support Directorate (SA-ALC/TIESM). They have been tasked to provide alternatives to chemicals, materials, and processes which are identified by the program office.

For the F-5, the next step was to incorporate the results of the analysis and ranking of hazards into a Pollution Prevention Plan for use by the F-5 Program Director. A technical team identified within the F-5 program office will be tasked by the program manager with verifying that the identified alternative chemical, material, or process will not adversely effect system performance when used in the specific application which was being analyzed. Once the alternative has been approved, the team will be responsible for appropriate changes to the support system, which will include, but not be limited to, updating the technical order system, updating the supply system, and updating the management information system.

There were three major goals for this thesis:

- 1. To conduct a hazardous materials analysis of the technical documentation available for the F-5A aircraft.
- 2. To develop a pollution prevention program for the Air Force F-5 Program Director.
- 3. To develop a generic approach for developing similar pollution prevention programs for the other aircraft managed by the Proven Aircraft Division.

Thesis Scope

This thesis is important because it supports the goals of at least two separate programs: pollution prevention, our national policy to protect the environment, and security

assistance, our national policy to support our allies, permit the sale of the military aircraft, and insure the logistics support of the aircraft thereafter. (69)

In his paper on "DoD Environmental Requirements and Priorities", Thomas E. Baca, Deputy Assistant Secretary of Defense (Environment) paraphrases Secretary Cheney as saying:

Defense and the environment is not an either/or proposition. To choose between them is impossible in this real world of serious defense threats and genuine environmental concerns. The real choice is whether we are going to build a new environmental ethic into the daily business of defense - make good environmental actions a part of our working concerns, from planning, to acquisitions to management. (8:335)

II. Background Review

National Policy

In 1990, President Bush stated:

Environmental programs that focus on the end of the pipe or the top of the stack, on cleaning up after the damage is done, are no longer adequate. We need new policies, technologies, and processes that prevent or minimize pollution - that stop it from being created in the first place. (41:619)

An EPA definition of pollution prevention is the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source. It includes practices that reduce the use of hazardous materials, energy, water, or other resources and practices that protect natural resources through conservation or more efficient use. (41:619)

The federal government has the capability to significantly influence both the development and the implementation of pollution prevention programs and technology. It does this in three ways. First, the government creates laws and regulations which effect everyone from private individuals to international businesses owned by U.S. citizens.

Next, the government operates a variety of manufacturing facilities and enterprises. These include the government-owned-contractor-operated (GOCO) manufacturing plants, as well as military installations, office complexes, and national parks and recreation facilities. Last, the government is a major consumer of manufactured goods, services, and raw materials. In all of these cases, the government has the opportunity to require the reduction of pollution, the minimization of hazardous waste, and the development of environmentally safe products and technologies. (41:621: 82:181-188)

Federal Law

In the past, the Department of Defense frequently sited the legal concept of sovereign immunity when dealing with environmental laws and regulations. Sovereign immunity provides the federal government with protection from lawsuits or other legal

Army government-owned, contractor-operated facilities were levied fines of more that \$1.5 million dollars for failing to comply with environmental legislation (85:14). In addition, sovereign immunity was thought to include government employees. That changed when three supervisors at Aberdeen Proving Grounds were the first government employees to be tried and convicted for ignoring environmental laws (85:133). Prison terms for violating these statutes (federal and state) range from six months to 15 years (29:7). The message is clear. Environmental laws apply to everyone.

The Pollution Prevention Act of 1990. The Pollution Prevention Act of 1990 is a statement of national pollution policy. In it, Congress declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible (41:622; 94). The Act specifically tasks the EPA to develop, identify, facilitate, and coordinate efforts to comply with its provisions. (41:622; 94)

The Clean Air Act Amendment of 1990. The 1970 Clean Air Act was amended in 1990 to address the most critical of the air pollution problems, including toxic air emissions, acid rain, smog, and stratospheric ozone depletion. Emphasis in the amendment was on pollution prevention - a change from previous documents. Of particular importance to the Department of Defense, the Amendment called for a phased reduction on chlorofluorocarbons (CFCs) and halons beginning in 1992. (41:622; 78:98-108)

U.S. Environmental Protection Agency Policy. In keeping with the trend towards emphasis on prevention rather than clean-up (92:112-115), the U.S. Environmental Protection Agency (EPA) published its own Pollution Prevention Policy in 1989. Then in February of 1991, is also issued a Pollution Prevention Strategy which provided an expanded version of its position and objectives. A major part of that strategy

was the development of a program that could achieve specific pollution prevention objectives in a reasonable amount of time. This strategy is called the 33/50 Program.

The 33/50 Program. The Office of Toxic Substances within the EPA is responsible for administering the 33/50 Program. The program itself is a voluntary pollution prevention initiative which builds on the EPA's policies and objectives. The program expects to reduce, by 50%, the release of 17 targeted chemicals and chemical compounds from a total of 1.4 billion pounds in 1988 to 700 million pounds in 1995. (41:625) The program has three goals: 1. to reduce national environmental releases of the EPA 17 to 50% of the 1988 levels by 1995; 2. to encourage pollution prevention rather than end-of-pipe treatment to accomplish this goal; and 3. to help foster a pollution prevention ethic in business (98:2).

International Agreements.

The last five years has seen an increased emphasis on a global approach to environmental concerns. The U.S. government has participated in both of the major world-wide conferences which have been held.

The Montreal Protocols. In September 1987, representatives from forty-seven countries met to discuss their concern over the depletion of the ozone layer. The result was a document called the Montreal Protocol on Substances that Deplete the Ozone Layer. The protocol became effective 1 January 1989 for the initial 28 nations who signed the agreement. By this agreement, the consumption level of selected ozone depleters and halons was frozen at 1986 levels, and the countries further agreed to a 50% reduction in consumption by 1999. (52:41). Former President Bush moved the phase out of U.S. production of ODC from 2000 to 1993 in February, 1992. Then, in November, 1992, the United Nations ratified the Montreal Protocol Treaty (Copenhagen amendments) which prohibits ODC halon/solvent production in 1994 and chlorofluorocarbon production in 1995 (19:A-13). Members of the European Community have already accelerated their

phaseout schedule for some compounds. Most chlorofluorocarbons must be cut 75% from each country's 1986 baseline by 1 January 1994, and completely phased out by 1995. (6:22)

The United Nations Conference on Environment and Development. The Earth Summit in Rio de Janeiro took place in early June, 1992, bringing together over 150 nations, 1400 non governmental organizations, and 8,000 journalists (43:1). The primary achievement of the Rio Summit is the global warming treaty, which incorporates into international law the idea that nations have agreed to take global environmental issues into consideration while they are making domestic economic decisions (38:33). Many of the nations that were represented at the conference were willing to propose specific timetables for the voluntary reduction of carbon dioxide emissions (3:1503). In addition, 178 nations agreed on a document which calls for environmentally sound development policies in underdeveloped countries (10:46). For those same countries, the concept of sustainable development does not imply that economic growth should not take place. Rather it implies that growth should not adversely effect the ecosystem (11:869-870; 38:33; 89:1075). Whether the conference was the success it was hoped to be, or not, it must be judged within the context of a process of increasing attention, sophistication, and effectiveness in the management of environment and development issues (43:1). On this criteria alone, it must be concluded a resounding success.

Air Force Environmental Policy

In October 1986, The Scientific Advisory Board (SAB) identified the need to consider hazardous materials in the weapons system acquisition process (WSAP). They also found that the mechanism to identify, manage, and control hazardous materials in the WSAP did not exist. In June 1987, Headquarters, USAF tasked Air Force Systems Command (AFSC) to develop proposed actions and initiatives necessary to implement the Scientific Advisory Board recommendations. In August 1987, the Deputy Commander for AFSC

(AFSC/CV) briefed USAF/LE concurring with the SAB report, and advising USAF that they had organized a Hazardous Materials Working Group (HMWG) at AFSC. AFSC/CV approved a plan to introduce biotechnical expertise early in the acquisition process, which was developed by the HMWG in December, 1987. In February 1988, the vice-commander of AFSC asked the commander of ASD to form a working group at the division level to parallel the AFSC group. In addition, a General Officers Steering Committee was formed. The ASD group was called the ASD Working Group: SAB Report on Hazardous Materials. Responsibility to chair the group was given to ASD/DE, (Civil Engineering), Mr. Eric Stevens. All ASD two letter organizations were asked to send members. The ASD Working Group initially concluded that management of hazardous materials should reside in DE. As a result, Mr. Stevens asked for, and received, two additional slots in his organization. He and a number of other group members visited various systems program offices (SPOs) to discuss the issue. The General Officer Steering Committee met, with specific direction to study the issue and provide long term direction. A primary focus of the group was to use Logistics Support Analysis (LSA) as the management vehicle for hazardous materials. In October, 1988, information from all of the groups was forwarded to AFSC, as they deliberated how to continue the efforts. As a result, AFSC/MO (Manpower) became the OPR to look at resources. In January 1989, Maj Gen Doppelt again discussed the issue with AFSC/CV, who in February directed the formation of another group - to be called the Acquisition Management of Hazardous Materials Working Group. Their primary responsibilities were to: 1. detail planned actions, 2. assign OPRs, and 3. establish milestones for implementation of a hazard materials management plan. The working group completed an initial action plan which was approved by AFSC/CV on 27 February 1989. In March, Col Coughlin (HSD/EV - Human Systems Division, Environmental) presented the HSD view to the AFSC/AFLC Commanders Conference. After that meeting, Maj Gen Doppelt personally

briefed Gen Randolph. As a result of that discussion, Gen Randolph directed the initiation of an HSD task force at Brooks AFB, TX to manage hazardous materials. Col Bill Smith, HSD/SD, formerly AFSC/SDT, was in charge, and program initiation was set for 1 October 1989. Also in late 1989, AFSC contracted with the MITRE Corporation to perform a preliminary evaluation of current status of hazmat management in the Air Force (57:3). The result was a series of documents which described these issues in detail (60; 61; 62; 63; 63; 64; 65; 66; 67).

The ASD SAB Working Group had met in early summer, 1989 to vote on which ASD organization should own the ASD Hazardous Material Management Organization. The three organizations being considered were ASD/EN (Engineering), ASD/DE (Civil Engineering), and ASD/SE (Safety). The ASD SAB Working Group voted for ASD/SE, and the ASD Hazardous Material Management task force (ASD/SEH), headed by Lt. Col. Harvey Clewell was established there. In December, 1989, Maj Robert Elves took over the office, and in mid 1991, he was joined by Capt Michael Boucher and Capt William Shelton. Their Hazardous Materials Management office encouraged the initiation of hazmat working groups in key ASD program offices, and viable programs were started for the B-2, F-22, and others. (91:1-5)

Emphasis in program offices was increased with release, in February 1991, of DoDI 5000.2, Part 6, Section I: System Safety, Health Hazards, and Environmental Impact. It required each acquisition program to identify and manage potential problems and alternatives (35: p 6-I-1 & 6-I-2). There was concern that program managers would not manage this area appropriately because there were no reporting mechanisms (17:9), however, that problem was laid to rest with the implementation of AF Supplement 1 to DoDI 5000.2 which required formal reporting at milestone decisions.

Another significant event occurred 26 - 29 May 1992. AFMC/EN sponsored an Ozone Layer Depelting Substances (OLDS) Elimination Workshop at Wright-Patterson AFB.

The workshop brought together over 122 participants from every part of the DoD. The objective of the workshop was to make available information on OLDS elimination efforts throughout AFMC and the DoD. (77)

After the release of the Pollution Prevention Program Action Plan (described below) in January, 1993, HQ AFMC formed a pollution prevention team tasked with implementing the program and spreading the philosophy throughout the Command (18:7). The 22-member Integrated Product Team is comprised of representatives from Civil Engineering (CE), Logistics (LG), Science and Technology (ST), Requirements (XR), Engineering and Technical Management (EN) Safety (SE), Command Surgeon (SG), and Contracting (PK), as well as the Aeronautical Systems Center (18:7).

Pollution Prevention Program Action Plan. On 13 November, 1991, Air Force Secretary Dr. Rice and Chief of Staff General McPeak released a draft memorandum which stated the Air Force policy on pollution prevention.

The Air Force is committed to preventing future pollution by reducing use of hazardous materials and releases of pollutants into the environment to as near zero as feasible. The key is to move quickly away from dependence on hazardous materials. We must mobilize our whole team and find ways to move faster. (99)

Air Force Pollution Prevention Program - Action Memorandum. The final version of the Pollution Prevention Program Action Plan was issued as the Air Force Pollution Prevention Program - Action Memorandum, on 7 January 1993. The wording of the final version was even stronger.

The Air Force is committed to environmental leadership. Our goal is to prevent future pollution by reducing the use of hazardous materials and releases of pollutants into the environment to as near zero as feasible. To achieve this, we must quickly move away from dependence on hazardous materials, actively reduce our waste streams, reuse the wastes we do generate, recycle what we cannot reuse, and expand purchasing programs

for recycled products. To succeed we must mobilize our whole team and find ways to move faster. (26:1)

The Plan included six objectives which were to guide Air Force actions. Of particular importance to this research effort is Objective 2:

Reduce the use of hazardous materials in existing (deployed) weapons systems by finding less hazardous materials and processes and integrating them into Technical Orders, Military Specifications and Military Standards. (26:2)

AF/LG was identified as the Office of Primary Responsibility (OPR), and SAF/MI, AF/CE, AF/SG, AF/XO, and Air Force Material Command (AFMC) were listed as Offices of Collateral Responsibility (OCR).

The Memorandum included a number of sub-objectives which are germane to this thesis. They include a commitment to institutionalize pollution prevention including hazardous materials minimization and management (26:2), implement proactive procurement policies and practices (26:2), and implement a hazardous material identification and tracking capability at the Air Logistics Centers (26:3).

Particularly important was a sub-objective which required: By the end of 1993 prioritize the hazardous material TOs, MILSPECS, and MILSTDS for existing weapons systems for review. By the end of 1995 review the worst 25% and by the end of 2000 complete the review for existing weapons systems (26:3). The initial review of technical orders, and the exhaustive review of a sample of technical orders performed during the conduct of this thesis were the first step towards compliance with this objective.

Air Force Ban on Purchases of Ozone Depleting Chemicals - Action Memorandum.

On the same day that the Air Force issued its Pollution Prevention Program, it also released the Air Force Ban on Purchases of Ozone Depleting Chemicals (ODCs) - Action Memorandum. The memorandum implemented the National Defense Authorization Act for Fiscal Year 1993, Title III, Section 326, Public Law 102-484 and the 11 August 1992 policy on ODCs issued by the Under Secretary of Defense for Acquisition, by instituting

an Air Force policy governing the purchase, use and management of controlled ODCs. (24:0) It had already defined the ODC problem, divided the controlled chemicals into Classes and Groups, and described the quantities of each chemical which could be legally manufactured (27:2, Annex 2).

The rationale for this step was significant. The memorandum stated:

We are taking this action for several reasons. Recent scientific data shows the earth's ozone layer is being destroyed far more rapidly than we previously believed, and for the first time, ODCs in the atmosphere threaten to deplete the ozone layer over populated areas of the world. Last month (December, 1992), the United Nations agreed to end chlorofluorocarbon (CFC) production by 1995 and halon production by 1994 at the Montreal Protocol renegotiations. This will result in a global ODC production ban. Additionally, declining market demand will likely create supply problems before the production phaseout date, jeopardizing missions dependent on a continued supply of these substances. (20:0)

The memorandum allowed waivers, but particularly noted that waivers permitted under this policy were only to be used to extend the time necessary to develop and implement alternatives, not to permit program managers to circumvent the intent of the law. It also stated that effective 1 April 1994, the Air Force would no longer purchase ODC solvents, and their associated equipment. All specifications and standards requiring ODC use would be tailored to allow non-ODC alternatives. And AFMC would review all Air Force Technical Orders to identify ODC use and provide their lists to program managers and directors to have them revised. This activity also has a goal of 1 April 1994. (20:5)

The most immediately significant requirement in the memorandum implemented Public Law 102-484, National Defense Authorization Act for FY 93. Section 326. It said: No contract awarded after June 1, 1993 shall include a requirement to use ODCs or any requirement that can be met only through the use of ODCs, without approval of SAF/AQ (20:5). This requirement essentially shut-down contracting for the Air Force on 1 June 1993. By the end of July, 1993, only one waiver has been approved. Resolution of this

issue has been the top priority in the acquisition community. Further amplification of this policy was provided in two additional documents, with more expected. The first, dated 21 May 1993 was a memorandum for directors of defense agencies on the subject of Elimination of Ozone-Depleting Substances (32). It identified the interim rule which amended the Defense Federal Acquisition Regulation (DFAR), and it described the criteria to be used to determine if a particular contract awarded before 1 June 1993 would "trigger" the rule. The second document was an Interim Air Force Contracting Policy for Elimination of Class I Ozone Depleting Substances, and was dated 26 May 1993 (23). It emphasized that Air Force policy on the elimination of Class I ozone depleting substances is more restrictive than that required by the statute or the DFARS language. Contracting issues will continue to be a significant problem to the DoD (90:13-15).

This was the status of the Air Force pollution prevention program by the middle of 1993.

National Security

Although adequate efforts to institutionalize pollution prevention in the Air Force are underway, there still remains the global impact of the operation and maintenance of American weapon systems which have been sold to our allies under the various security assistance programs. In addition to our own effort to provide national security, the United States is concerned with the support and encouragement of our allies. Our concern should include a responsibility to identify for elimination or minimization those hazardous chemicals and materials which we have required in the maintenance and operation of security assistance weapon systems, and which we have targeted for elimination from our own current weapon system inventory. (13:Ch 6)

Foreign Policy. A primary means of carrying out foreign and national security policy has been the sale or transfer of weapons systems, together with their logistics support,

training, and various other services to our allies. (34) The term that is used to describe the activities carried out under this concept is "security assistance".

Security Assistance. Security Assistance is defined as:

Groups of programs authorized by the Foreign Assistance Act of 1961, as amended, and the Arms Export Control Act (ACE) of 1976, as amended, and other related statutes by which the United States provides defense articles, military training, and other defense related services, by grant, loan, credit, or cash sales in furtherance of national policies and objectives. (16:33)

Included under the umbrella of Security Assistance are six major program components:

1. Foreign Military Sales (FMS) and Foreign Military Construction Sales Program, 2. Foreign Military Financing Program, 3. Direct commercial sales under the AECA, 4. International Military Education and Training, 5. The Economic Support Fund, and 6. Peacekeeping Operations. Foreign Military Sales, Foreign Military Construction Sales, and direct commercial sales are funded by the gaining country. All of the other programs are funded using United States government funds. The Defense Institute of Security Assistance Management has pointed out, in its management text, that Security Assistance is not a philanthropic effort. The United States offers security assistance to strengthen the national security of friendly nations, and to support existing or prospective democratic institutions and market-oriented economies (16:5).

The Air Force Security Assistance Program. The Office of the Secretary of the Air Force, Deputy Under Secretary for International Affairs is the focal point for the implementation and management of security assistance for the Air Force. Management responsibility for particular items can be delegated to the appropriate major command. In particular, follow-on support for weapon systems is managed through the Air Force Security Assistance Center at Wright-Patterson AFB, Ohio. (16:93)

International Logistics. International logistics is related to security assistance, but does not include the aspects of the Economic Support Fund, Peacekeeping Operations, and International Military Education and Training. International logistics is a way to provide military logistic support to countries participating in security assistance programs. (16:35)

Total Package Approach. One reason for the success of the U.S. security assistance program is a concept called the total package approach. The total package approach is a means to provide the participating country with all of the relevant information needed to plan and to obtain the support items and services which are necessary for acquisition and operation of the chosen weapon system. (16:144)

San Antonio Air Logistics Center Proven Aircraft Division. Personnel assigned to San Antonio Air Logistics Center Proven Aircraft Division are the System Program Managers for 29 weapons systems which are no longer in the active Air Force inventory, but which have been provided to foreign countries. Proven Aircraft personnel maintain liaison with the supported countries, provide supply support, help identify existing and incipient supply support problems, and coordinate resolution of such problems.

F-5 Program. The primary focus of Proven Aircraft is the F-5 weapon system.

(Figure 1) The F-5 Technical Coordination Group (TCG) and Systems Program

Management Branch (SA-ALC/LAVF) is the focal point for international logistics support and management of the F-5 aircraft worldwide. Their Branch Chief is, in effect, the F-5 Program Director. The TCG also serves as a point of contact and central source of information on F-5 technical and logistics issues and concerns. The F-5 Technical Coordination Group is contracted by the 24 member countries (Table 1) to provide them with the expertise and information necessary to operate and maintain the F-5.

In the fall each year, the F-5 TCG sponsors a world-wide review. The review has proven to be an effective forum to discuss pollution prevention and hazardous waste minimization efforts.

Table 1. F-5 Technical Coordination Program Member Countries.

Bahrain	Jordan	Norway	Taiwan
Brazil	Kenya	Philippines	Thailand
Canada	Korea	Saudi Arabia	Tunisia
Greece	Malaysia	Singapore	Turkey
Honduras	Mexico	Spain	Venezuela
Indonesia	Morocco	Switzerland	Chile

The TCG supports all models of F-5 aircraft, but primarily the F-5A, F-5B, F-5E, and F-5F. The F-5 Tiger aircraft (72:I-1) is a supersonic tactical fighter aircraft, manufactured by Northrop, and designed for high performance in an air superiority role. It is also used in an air-to-ground, and a training role. Reliability, maintainability, and operational flexibility were emphasized in the original design with the intent to field a system which had a low initial cost, low operating cost, and minimum logistics requirements. At the same time, the system was easy to maintain, quick to "turnaround" in combat, and capable of sustaining high sortie and readiness rates. (72:1-2) At one time, there were more than 2500 F-5 aircraft flying in 30 countries around the world (72:I-1).

III. Methodology

Identification of Problem Processes, Chemicals, and Materials.

The primary focus of this phase of the actual F-5 Pollution Prevention Program is the identification of problem processes, chemicals, and materials. The easiest way to identify problems, from the point-of-view of a Program Office, is to let a contract with the prime contractor, to review TOs, locate occurrances of ODCs or hazmats, and suggest alternatives. This is also the most expensive way to identify problems. At a lower level of cost and activity, automation of TOs, and automated word search of TOs are a possibility. The automation efforts of AFMC/ENX and SA-ALC/TIESM, discussed in the section on automation, are examples. At the lowest level is a by-hand search of the TOs to identify ODCs and hazmats. While not expensive in terms of contracting it is still very expensive in terms of time and effort. The individual reviewing the TO must understand both the context in which the chemical, material, or process occurs and the ODC and hazmat search criteria. A limited by-hand search was conducted for this thesis.

Initial Technical Order Identification and Detailed Review. Four F-5A technical orders were initially selected as having the greatest possibility of having numerous examples of ODCs and hazmats. The TOs which were reviewed included Aircraft General (1F-5A-2-1, through Change 14), Ground Handling, Servicing, and Airframe Maintenance (1F-5A-2-2, through Change 33), Pneudraulic Systems (1F-5A-2-4, through Change 19), and Powerplant (1F-5A-2-6, through Change 15). The TOs were selected (27) based on the author's aircraft maintenance experience, and after discussion with maintenance specialists.

The TO analysis was initiated in December, 1992, and completed prior to the author's trip to Kelly AFB, Texas, the last week of April, and the first week of May, 1993.

Reviewing a 200 to 300 page TO and highlighting every occurrance of a chemical,

material or process took about eight hours to accomplish. As an additional exercise, during the trip to Kelly AFB, the author reviewed the "B" model version of the *Powerplant* TO: 1F-5B-2-6. Using the "A" model spreadsheet, described below, the author was able to conduct the "B" version review in one and one-half hours.

SA-ALC/LAV at Kelly AFB maintains the F-5 TO library. While at Kelly AFB, the author also did a "quick look" review of the first 181 TOs in the F-5 library (24). The goal was to rapidly identify those TOs that did not require review, those that required some review, and those that required detailed review. Of the 181 TOs, 116 did not require additional analysis. 65 TOs, including the five TOs that had been reviewed by that time, required some level of detailed analysis. (See Appendix B in the F-5 Pollution Prevention Plan, Appendix A)

Creation of Spreadsheet Data Base. Once the chemicals, and materials were highlighted in the text, the next step was to put them in a form that would enable the Pollution Prevention Program Manager (PPPM) to sort, review, and manage them. The author chose to use an Excell spreadsheet to accomplish this task. The author created a double-wide spreadsheet that contained the following fields: chemical, known as, commercial name, military name, reference, Federal Stock Number (FSN), page, line, current practice is to use, non-hazardous alternative, type of operation, crew size, quantity, time, individual risk, environmental risk, and comments. Some of the information is readily available from the text of the TO. Some information is implied (e.g. type of operation). A lot of the information is not easily obtained, and will probably be added-to and updated over a period of time. Eventually actual substitutes will be added to the data providing an audit trail of information on the elimination or minimization effort that was undertaken in each instance. The actual spreadsheets for the first five TOs have been included in Appendix B.

Sort of Data Base by Management Category. After all of the available information was loaded into the spreadsheet data base, the data was sorted based on the author's management criteria. Five management criteria were identified: special management, operational management, tactical management, strategic management, and minimal management. Special management included compound hazards, for example, materials or chemicals which were both nuclear hazards and hazardous materials; or explosive hazards and hazardous materials. At this time, no compound hazards have been identified for the F-5. The operational management category included materials and chemicals which have been identified as significant individual or environmental risks, or which require special emphasis because of laws, treaties, and policies. This category presently includes ozone depleting chemicals and the EPA 17 (Table 2) industrial toxics (98).

Table 2. Environmental Protection Agency List of 17 Industrial Toxics

1. Benzene	7. Lead & Lead	13. Tetrachloroethylene
Cadmium & Cadmium Compounds	8. Mercury & Mercury Compounds	14. Toluene
3. Carbon Tetrachloride	9. Methylene Chloride	15. 1,1,1, - Trichloroethane
4. Chloroform	10. Methyl Ethyl Ketone	16. Trichloroethylene
5. Chromium & Chromium Compounds	11. Methyl Isobutyl Ketone	17. Xylenes
6. Cyanide & Cyanide	12. Nickel & Nickel	
Compounds	Compounds	

Tactical management includes materials and chemicals which have been identified as a moderate individual or environmental risk, or which are projected to be a future problem (17:10). As an example, volatile organic compounds (VOC) have been implicated in the development of smog. In the near future, the EPA is expected to target stationary sources of VOCs in an attempt to reduce their VOC emissions. A primary source of VOCs for the DoD are paints. Strategic management was set up for materials and chemicals which have a low, but identifiable individual or environmental risk. As an example of this management category, some lubricating oil may contain tricresyl phosphate, a readily absorbed poisonous substance. Minimum management is the last category. It includes materials and chemicals which are identified in F-5 aircraft TOs but which are not considered hazardous materials at this time. They include such things as fuels, hydraulic fluid, and lubricating oil. These management categories were used to produce the operational and tactical management sections of the 30 June 1993 F-5 Pollution Prevention Management Plan. As the program progresses, additional rankings within category based on actual risk (15; 44:451-464; 53) will be developed.

Creation of the F-5 Pollution Prevention Program.

In order to create a pollution prevention program, it is necessary to understand that the goal is prevention of pollution at its sourse. The first task is to identify a particular chemical, material, or process as a potential pollutant, then eliminate or minimize its occurrance in the operation and maintenance of weapon systems. (46; 47; 48; 68; 100) Pollution prevention is a total systems program that includes not only waste generation. but also early systems requirements planning and refinement, materials selection. process development, materials acquisition, handling and use of materials, production activities, process management, waste management, and disposal (19:1(Summary)) Defining the term "hazardous material" is a somewhat more involved process because there is no simple answer. The definition of hazardous material varies depending on the

federal environmental legislation in which it is found. The DoD defines a hazardous material as:

Anything that due to its chemical, physical, or biological nature causes safety, public health, or environmental concerns that result in an elevated level of effort to manage it. (35)

Strategy for Management. The F-5 Pollution Prevention (PP) Program Manager (PM) is responsible for planning, coordinating, and documenting efforts towards minimization or elimination of chemicals, materials, and processes which are hazardous to individuals or the environment. The F-5 Program Director is informed or briefed on the problem areas, the proposed alternatives, and the status of the efforts. The Director is then responsible for making an informed decision, and initiating efforts to obtain required resources. Once an acceptable alternative is agreed upon, the Integrated Product Team, or other individuals appointed by the Program Director, implement the change in the system. Results are forwarded to the F-5 PP Program Manager for inclusion in the next quarterly report.

F-5 Pollution Prevention Plan The F-5 Pollution Prevention (PP) Plan is intended as a tool used to inform the F-5 Program Manager of the extent of the problem, document on-going efforts, and report completed actions. Lt Col Clewell has pointed out that such a plan is the key to tying the overall pollution prevention effort together (14:unnumbered). The full F-5 PP Plan will be sent to the Program Manager quarterly, with monthly updates to document newly identified ODCs or EPA 17 toxic materials during the identification phase of the program. Eventually all of the ODCs and EPA 17 materials will be identified, and alternatives will have started to be identified for all of them. At that point, a new round of identification of general hazmats will be started. In addition, as additional problems are uncovered, new criteria for new hazmats will be released to the DoD for identification and resolution. In fact, in further iterations, alternatives which were

identified in this round of activity could be identified as a problem for future efforts (104:1055-1061). The initial F-5 PP Plan created as a result of this thesis was sent to the Program Director on 30 June 1993, and is included as Appendix A. The PP Plan will be both a repository of information documenting pollution prevention management actions and an audit trail of how the actions were considered and implemented.

Metrics will be included in the plan when appropriate, to enable the Program Director to measure program health and effectiveness as we implement our strategy to help reduce and prevent impacts to human health and the environment (22:2). Tools for measuring waste reduction (30; 31) are important management considerations.

Integrated Product Team. To continue the efforts started in this thesis, an integrated product team (IPT) was identified in the Proven Aircraft Division (SA-ALC/LAV). The team, headed by Mr. John Rich, is expected to work the day-to-day issues that arise as a result of this effort. They will work with the individual assigned to support LAV to identify potential alternatives, and to determine if the proposed solution will be acceptable in the particular application under consideration. Once concurrence of the engineering and logistics members of the team is obtained, the change will be implemented. Some of the activities that should occur at that point are identified in more detail in the IDEFo systems analysis described below, and include updating the technical order system (28), the supply system, any applicable data management or management information system, and any other appropriate function or organization. Details on how the information will be presented to the foreign governments who own and fly F-5 aircraft have not been identified.

Alternatives. The Materials Engineering Section, Specialized Engineering Branch, Engineering Division, of the Technology and Industrial Support Directorate (SA-ALC/TIESM) is responsible for identifying alternatives to identified hazardous materials, chemicals and processes. Ms Catherine Gastauer is the focal point for all Proven Aircraft

activities. The Section is small - only five people at present, and, since they are also responsible for identifying alternatives for all of the other programs at their ALC, they have determined that they will contract-out a major portion of their documentation review, hazmat and ODC identification, and proposal of alternatives activities. This same organization was responsible for the development of an automated technical order review process for hazmat identification called TORP: Technical Order Review Program. TORP will be discussed in more detail in the section on automation issues. Two categories of replacement alternatives can be defined: simple and complex. An example of a simple replacement alternative is the replacement of solvent P-D-680 Type II, when used on machined aluminum, with P-D-680 Type III. There is very little difference between the two items, and minimal impact on performance, life cycle cost, retrofitting, and testing. A complex replacement alternative, on the other hand, has significant impact on all of these areas. A good example is identification of an appropriate alternative for halon.

Alternatives exist, but each pay a penalty in performance, weight, volumn, and retrofit costs, at the very least.

Decision Implementation. Once the potential alternatives have been identified by the Materials Engineering Section, the information is forwarded back to the Proven Aircraft Division (most likely, to the IPT mentioned previously) for review by their technical staff to ensure that the particular alternatives are acceptable in the application in question. In cases where multiple alternatives are acceptable, the technical staff may suggest a particular alternative, using internally developed criteria. At present, there are very few tools available to help the technical staff or the program manager make such a decision. although there are a few helpful books which attempt to address this point (13; 15; 44; 76; 103). In the past, such decisions in the Air Force may have been based on lowest unit cost. Life cycle costs of hazardous materials are much more complex to analyze. The Human Systems Center, Pollution Prevention Office (HSC/PP) has been responsible for

the development of a Hazardous Materials Life Cycle Cost model (48). The model describes, for a service specific module, the costs associated with a particular chemical or material in terms of the sum of a series of separate costs. The cost categories include: procurement, personal protection, management, handling, potential legal/ environmental liability, medical, and disposal. The manual states that:

The procurement cost element includes the actual purchase price of the hazardous materials plus the cost of transportation to the site of use, whether it be depot or operating location. The personal protection cost element consists of three sub-elements: the cost of the personal protection equipment, including maintenance and support, the cost of inefficiency as a result of wearing the equipment, and the cost of dispensing the equipment. The cost of handling is attributed to two sub-elements: the cost of subdividing, labeling, and distributing the materials, and the cost of lost productivity due to the controls placed on the hazardous materials and their distribution. The potential legal/environmental liability cost element covers potential liability for five components: toxic torts, regulatory authority correspondence, real property damage, contaminated water treatment, and natural resource damage. Management includes those functions necessary to maintain oversight of the hazardous materials at the locations where they are used. This is primarily a labor cost. The medical cost element consists of four subelements: occupational physical examinations, including lost time while the physical is administered; medical surveillance; lost time due to illness/injury as a result of hazardous materials; and industrial hygiene surveys. Lastly, the disposal cost element encompasses the cost to operate an Industrial Wastewater Treatment Plant (IWTP), where applicable; waste collection and handling; contractor disposal; and hazardous waster analysis and classification. (48:p2-2)

While this could be an acceptable way to differentiate costs, not all of the basic units of cost information are collected and available. However, as more people reach the point in their program where they must make this type of decision, there will be a greater demand for tools and data to facilitate the decision making process.

Updates and Revisions. The F-5 Pollution Prevention Program is an effort which will continue during the life of the F-5 weapon system. Replacement for an existing problem process, chemical or material is a "best guess" at this point in time. The replacement chemical, material or process could itself be identified as a problem in the future as identification criteria and national interest changes. Updates and revisions to the F-5 PPM Plan will occur frequently. At present, the F-5 PP Management Plan (Appendix A) is being produced quarterly, with potential monthly updates to the problem identification section.

Systems Analysis of F-5 HAZMAT Minimization Process.

To understand how the F-5 PPM Program fits into the overall Air Force PPM Program, the author conducted an systems analysis of the AF PPM Program process. The analysis was produced using IDEFo as the modeling language. IDEFo is described in greater detail in the following section. The F-5 PPM Process is described within the AF context, and from the point-of-view of the F-5 PPP Manager.

IDEFo. IDEFo (read as IDEF sub zero) is a technique that enables people to understand complex systems in a complete and precise manner, and enables them to communicate their understanding (87:pA-2). Applying the IDEFo methodology allows the investigator to model a "top down" look at the system in question. The charts are arranged in a hierarchy, starting with the top level chart (Figure 2). The chart is arranged so that each function box can have inputs (from the left), outputs (to the right), constraints (from the top), and mechanisms to accomplish the function (from the bottom). Each box on each chart can then be further described on a subsequent ("child") chart. Examples of such functional descriptions can be found in a number of sources (39; 45; 86; 87). The set of IDEFo charts created for this thesis are included as Figures 2 through 7.

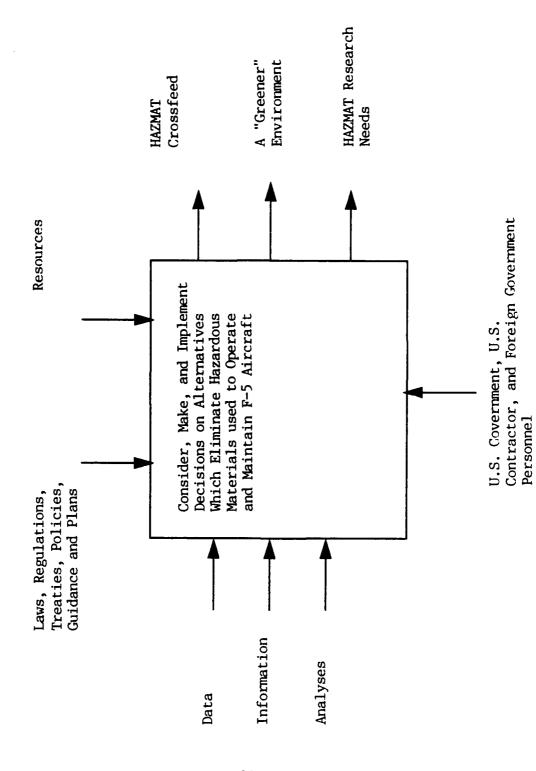


Figure 2. The Goal: Consider, Make and Implement Decisions (A-0)

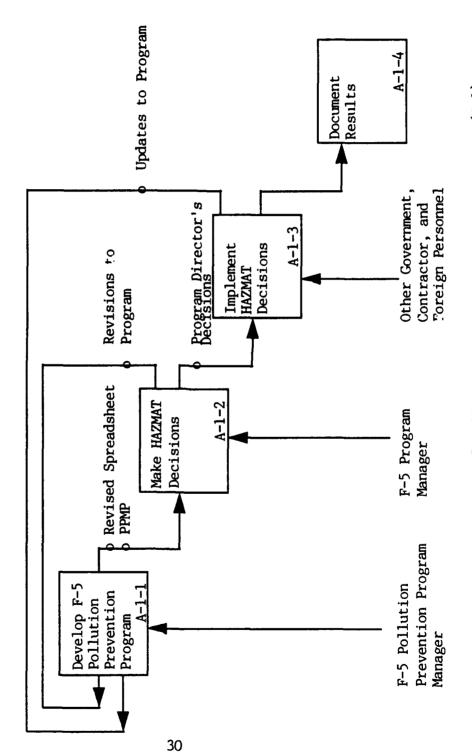


Figure 3. The F-5 Pollution Prevention Management Process (A-1)

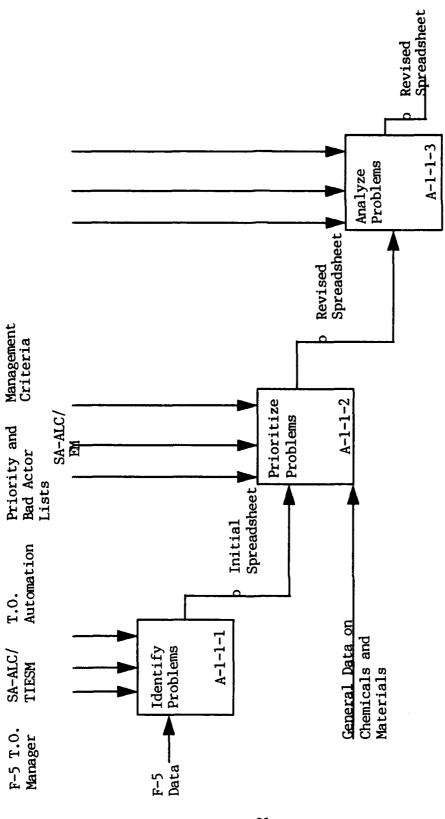
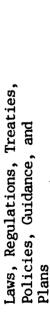


Figure 4. Develop the F-5 Pollution Prevention Program (A-1-1)



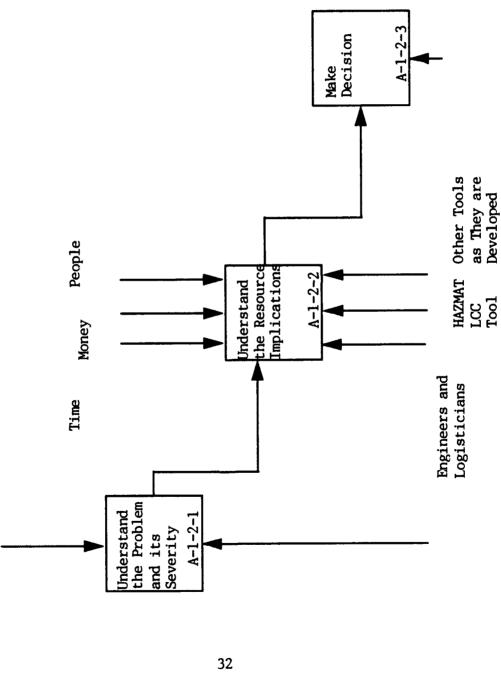


Figure 5. Make HAZMAT Decisions (A-1-2)

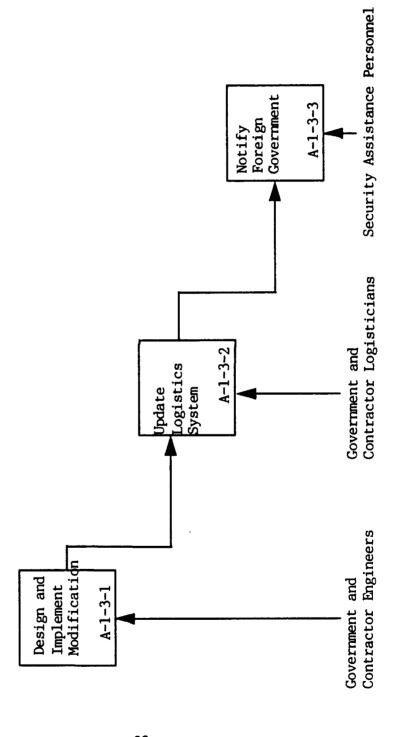


Figure 6. Implement HAZMAT Decisions (A-1-3)

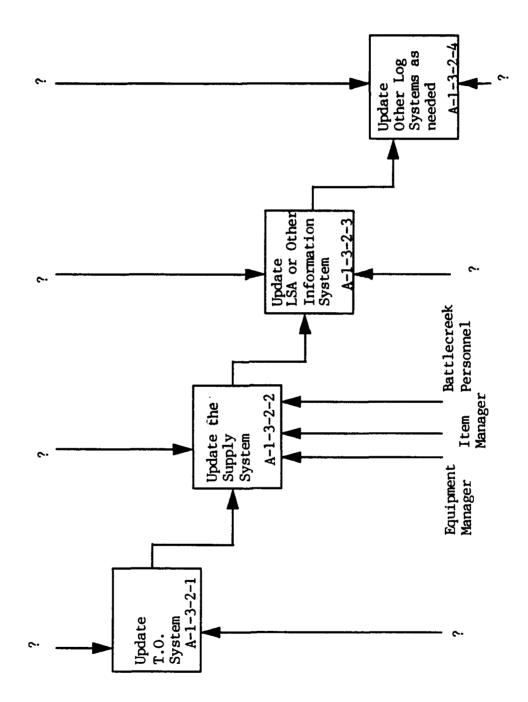


Figure 7. Update the Logistics System (A-1-3-2)

IV. Utility of This Research to Generic Pollution Prevention Programs. General Utility.

The F-5 weapon system was deliberately chosen as a test vehicle for this Pollution Prevention effort. The F-5 itself represents the lower end of the advanced technology scale, and as such, its pollution problems may be easier to emcompass. In addition, all of the logistics supportability functions were available in one location: the Proven Aircraft Division, Kelly AFB, Texas. As the PPM Program evolves, the author will be able to expand the scope of the systems analysis to the working level. Even the six IDEFo charts that were developed have been useful in describing broad levels of activity, and identifying needs and constraints.

The F-5 program is not intended to represent the only way to accomplish pollution prevention management in the Air Force. Its utility is in demonstrating the various aspects of PPM which must occur on each program, regardless of the mechanism that is used to implement the program.

Applicability.

The F-5 Pollution Prevention Program is applicable to a variety of other efforts:

To the Navy F-5 Program. The Navy continues to fly the only F-5 aircraft still operated by the DoD. They are used as "aggressors" in Red Flag exercises. Their maintenance is done by contract. Both the Navy and the contractor program managers have been contacted, and the F-5 spreadsheets provided.

To T-38 Aircraft. There are significant similarities between the F-5 and the T-38 aircraft. Discussion has already been initiated with the T-38 Program Office at Kelly AFB.

The T-38 is also maintained using contractor support, and the contractor is expected to identify and eliminate ODCs and hazmats from the activity. T-38 office personnel obtained copies of all of the F-5 spreadsheets created to date. As additional informatiaon is developed for the F-5, copies will be forwarded to the T-38 office for their use.

To Other Aircraft Managed by the Proven Aircraft Division. Once the management structure has been set-up for the F-5 program, similar activities can be initiated for other active weapon systems.

To Other Security Assistance Program Aircraft. With the program in place in the Proven Aircraft Division, it is possible to set up briefings to discuss the development and implementation of the F-5 PPM Program, and its applicability to other Security Assistance aircraft. Initial discussions have already taken place between the Director, and personnel from the AFMC International Affairs office (AFMC/IA) and the author of this thesis. The dialog will be continued with Security Assistance personnel at Kelly AFB, as well, to determine the best approach to insuring that foreign customers have access to pollution prevention information and TO updates.

V. Recommendations

Three areas were found to need additional emphasis by the Environmental Management communities: 1. crossfeed of information, 2. a useful hazardous materials cost accounting system, and 3. better decision analysis tools.

HAZMAT Crossfeed of Information.

Individual organizations at ASC, and at the ALCs are collecting data on alternatives, research and development, and research needs. Hazmat data bases are currently available which address property, estimation, regulatory sources, hazard response, hazmat tracking, and incompatibility prediction (58:unnumbered) A major data repositiory effort, such as the one required by ASC/EMP (21:31) and proposed by HSC/EMP (7:unnumbered) is necessary to prevent extensive duplication of effort. It should also be compatable with stand alone software, as well as with such efforts as the EPA pollution Prevention Information Exchange System (97) and the Pollution Prevention Information Clearinghouse (96).

"Green" Accounting System.

DoD Directive 4210.15 Hazardous Material Pollution Prevention states that It is DOD policy that hazardous material shall be selected, used, and managed over its life-cycle so that the Department of Defense incurs the lowest cost required to protect human health and the environment (33). At this time it is difficult to accurately assess any of the costs of hazardous materials for a system. An accurate, complete data base of environmental costs does not exist. We need it.

One problem is that reported 'costs' rarely distinguish between operating or maintenance expenses and capital investments (46:4). That distinction needs to be made in an accounting system for environmental costs. The same system should allow you to allocate hazardous materials and residual costs to specific products and activities rather

than effectively hiding them in overhead accounts. Such a system should make it obvious that pollution prevention and waste minimization save money. Other issues that need to be considered are the relative costs per system by acquisition phase (4:6-7) and optimizing product profitability while minimizing costs (74:28-31).

Decision Making Criteria and Tools.

When the Program Manager is presented with the the information about alternatives, he or she must make a decision. The decision in the past has been based on a 'best guess' understanding of the implications of the decision. The life cycle cost model goes a long way towards quantifying such a decision, but more work needs to be done in other types of logistics trade-off tools.

VI. Conclusions

Evaluation of Research Objective No. 1.

The first research objective of this thesis was to conduct a hazardous materials analysis of the technical documentation available for the F-5A aircraft. That activity was accomplished, and the resulting spreadsheets were provided to the F-5 program office, and a number of other organizations. The spreadsheets were then used as the basis for the development of a PPM plan as part of a PPM program.

Evaluation of Research Objective No. 2.

The second research objective of this thesis was to develop a pollution prevention program for the Air Force F-5 Program Director. Systems analysis was used to describe the F-5 PPM program, and to relate it to the broader AF PP program. The development of the program received positive support from the F-5 program office, where an IPT was initiated to continue the effort. The program is currently being used to support the F-5 system.

Evaluation of Research Objective No. 3.

The third research objective of this thesis was to develop a generic approach for developing similar pollution prevention programs for the other aircraft managed by the Proven Aircraft Division. The IDEFo systems analysis can be used as a generic description of pollution prevention management, and is readily capable of being modified for other specific programs. Documentation generated as a result of creation of the F-5 PPM program was provided to the AFMC IPT on PP. Members of the IPT are reviewing the material, and expect to use it as an example of a pollution prevention program for an existing weapon system.

Conclusion.

This thesis research successfully combined the goals of both the environmental and the security assistance programs. We in the Department of Defense have an ethical imperative to reduce to the extent possible, requirements which compel others to generate toxic and hazardous waste. In order to accomplish this objective, analysis and understanding of the processes involved is essential. Increased understanding of the problems, and interest in on-going research will encourage a variety of new and innovative approaches to pollution prevention. Substitution of one chemical, material or process for another is not the only potential solution. The following is a sampling of issues which could also be considered in a pollution prevention initiative.

- 1. Global monitoring. One product of the "cold war" may be put to constructive use in the management of the global environment. In collecting extensive and detailed information about military and industrial activities in countries around the world as part of the intelligence gathering effort, the government has been inadvertently collecting information about the health of the global environment. Efforts are underway to evaluate the scientific value of the intelligence data on-hand (12:66). In a related effort, a light detection and ranging system (LIDAR), developed at Los Alamos as a warning system against chemical or biological attack during Desert Shield, is being used analyze air pollution in Mexico City. The data being collected will be used to determine the effect of various cleanup options on that city's pollution problems. (54:57-58) Satellites in general have numerous uses as tools for environmental planning, and as a platform for widespread education on environmentala issues (55:9-14)
- 2. Funding for research. The majority of funding in the environmental budget has been used for clean-up. The amount of money spent in the past should not concern us as much as the fact that there is a disconnect between the areas that have been perceived as most important, and the amount of resources that have been committed to those areas. In her

report on federal funding for environmental research, Barbara Mandula pointed out that the Department of Defense was omitted from the estimate of funding, since most of its environmental research is connected to sight remediation (56:1498).

- 3. The importance of technological solutions. Alvin Alm writes the ES&T Regulatory Focus column in Environmental Science and Technology. He recently pointed out the importance of technology as a tool which can help solve a variety of environmental problems. Some of those technologies include integrated measurement and analytical systems to record and monitor environmental change; sophisticated sensors; improved computers and expert systems; new fuels; electric vehicles; and teleconferencing and communication. (1:1300). Other pollution reducing technologies include plastic grit to depaint aircraft parts or baking soda, lasers, or microorganisms to do the same job (9:24; 100:69) Hughes Aircraft Co. recently announced a technological breakthrough in the development of a new flux material which will reduce CFC based solvent use, speed manufacturing, and save millions of dollars a year (71:45). And San Antonio Air Logistics Center has developed a process that uses an orange-based, biodegradable cleaner called Citrikleen, rather than other more hazardous products, to prepare aircraft surfaces for painting (83:1). There are many more examples (73; 88:1-2)
- 4. Total quality management. Pollution prevention and Total Quality Management are two areas which are similar in their efforts. The opportunity to include pollution prevention into existing TQ structures could generate creative and innovative solutions to problems at the working level. (2:452) Both TQM and pollution prevention depend on creativity, a team approach, employee empowerment and the support of corporate management (5:35).
- 5. Industrial ecosystems. As a potential solution to some of the pollution prevention problem, the concept of an industrial ecosystem has merit and should appeal to the logistics community. In an industrial ecosystem, the industrial outputs of one facility

become inputs to the manufacturing process in another facility. (93:167) Obviously, a significant amount of planning is necessary to make such a system work. The benefits, however, are obvious. Industrial waste becomes a medium of exchange. The Danes have created such an industrial ecosystem. The Kalundborg complex is a closed-loop industrical ecosystem which includes an electrical power plant, an oil refinery, a biotechnology production plant, a plasterboard factory, a sulfuric acid producer, cement producers and local agricultural/horticultural developments (75:8-9).

6. The Germans have taken a different approach to pollution reduction of the municiple waste created by packaging. German legislation states that packaging must be taken back, reused or recycled outside of the public waste management system.

Following the principle that 'the polluter pays,' those who create packaging will be responsible for collecting, recycling and disposing of packaging waste (40:1). Similar requirements could be levied on contractors supplying the DOD.

The environmental outlook is not all "doom and gloom". There is a tremendous market potential in developing and providing expertise for the new field of environmental economics (81:26). The cleanup and control dollars spent by a company either pay their own workers or pay their subcontractors, creating an expanding series of jobs, profits, and revenues (46:4).

To conclude that 'the enemy is us' is not especially helpful. The solution also is us. The true enemies are ignorance, inadequate response to growing dangers and resistance to change. (47:16) The attitude and the actions of the DOD and the Air Force are changing with regard to hazardous materials and pollution prevention. In the words of a slogan created for a "Green Manufacturing" conference: The pollution you don't make, you don't have to clean up! (42) Change will occur, but it will take time, money, and human resources to make it happen. In the words of Gary Vest, Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health, We can't

afford to clean up to the extent we would like, but we do owe our allies responsible behavior (84:31). One important aspect of responsible behavior, championed in this thesis, is eliminating the requirement to pollute. We owe it to ourselves, our allies, and our planet.

Appendix A: F-5 Pollution Prevention Plan

Pollution Prevention Management Plan F-5 Pollution Prevention Management Program Developed by: Capt Janice M. Gavern

Current as of: 30 June 1993

Section I. Executive Summary.

- 1. Introduction. The F-5 Pollution Prevention Management Program provides the means by which the F-5 Program Manager is able to identify, classify, and manage the hazardous materials which have been documented as required to operate and maintain the F-5 aircraft. The goal of this program is to significantly reduce the number of such required materials and chemicals by identifying, and specifying for use, those non-hazardous alternatives which will reduce the individual and environmental risk incurred in the operation and maintenance of F-5 aircraft. Current information regarding identification, analysis, classification, and required management actions are contained in this management plan.
- 2. Scope. The F-5 Pollution Prevention Management Plan (PPMP) consists of two parts: an Executive Summary, and a detailed Plan, which are revised and updated quarterly. The PPMP is the vehicle which the F-5 Pollution Prevention Program Manager uses to document the current status of the Program. The F-5 Program Manager will use the plan to identify hazardous materials alternatives projects to be initiated, and to document the results of previous projects.
- 3. New Projects. This plan identifies 43 operational management occurrences, and 9 tactical management occurrences of hazardous chemicals or materials. This information should be used by the recently created F-5 Integrated Product Team on Pollution Prevention, headed by John Rich (DSN 945-6825), to initiate modifications which eliminate the chemical or material from use.
- 4. On-going Projects. There are no current on-going projects.
- 5. Completed Projects. There are no current completed projects.
- 6. Next Report. The next quarterly F-5 Pollution Prevention Management Plan will be released on 30 September 1993.
- 7. F-5 Pollution Prevention Plan Manager. The point-of-contact for the F-5 Pollution Prevention Management Plan is Capt Janice M. Gavern, SA-ALC/LAV, Kelly AFB, Texas. She can be reached during the week at DSN 785-9750, commercial (513) 255-9750, FAX 986-4511 or (513) 476-4511.

Section II. F-5 Pollution Prevention Plan

1. Introduction. The F-5 Pollution Prevention Management Program provides the means by which the F-5 Program Manager is able to identify, classify, and manage the hazardous materials which have been documented as required to operate and maintain the F-5 aircraft. The goal of this program is to significantly reduce the number of such required materials and chemicals by identifying, and specifying for use, those non-hazardous alternatives which will reduce the individual and environmental risk incurred in the operation and maintenance of F-5 aircraft. Current information regarding identification, analysis, classification, and required management actions are contained in this management plan.

2. Background.

- a. F-5 Program. The primary focus of the Proven Aircraft Division (SA-ALC/LAV) is the F-5 weapon system. The F-5 Technical Coordination Group (TCG) and Systems Program Management Branch are the focal points for international logistics support and management of the F-5 aircraft worldwide. The TCG also serves as a point of contact and central source of information on F-5 logistics issues and concerns. The F-5 Technical Coordination Group, Technical Section, represents the 23 member countries who fly the F-5, and provides them with the management expertise and information necessary to maintain technical integration, monitor design configuration, and coordinate reliability and maintainability issues. In the fall each year, the Proven Aircraft Division sponsors a world-wide review. The review will be an appropriate forum to disseminate the pollution prevention and hazardous waste minimization information developed in the F-5 Pollution Prevention Management Program..
- b. Environmental Law. One section of the Clean Water Act is particularly relevant to the management of the F-5 program. In 33 USC 1251, the Clean Water Act (Federal Water Pollution Control Act as amended, Declaration of Goals and Policy, Sec. 101. (a), it states that "The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this Act . . . (a.3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited; . . . (c) It is further the policy of Congress that the President, acting through the Secretary of State and such national and international organizations as he determines appropriate, shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction and elimination of pollution in their waters and in international waters and for the

achievement of goals regarding the elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws." (Italics added.)

3. Authority. On 7 January, 1993, General Merrill A. McPeak, USAF Chief of Staff, and Donald B. Rice, Secretary of the Air Force released an action memorandum which discussed the Air Force Pollution Prevention Program. It said, in part, that

"The Air Force is committed to environmental leadership. Our goal is to prevent future pollution by reducing use of hazardous materials and releases of pollutants into the environment to as near zero as feasible. To achieve this, we must quickly move away from dependence on hazardous materials, actively reduce our waste streams, reuse the wastes we do generate, recycle what we cannot reuse, and expand purchasing programs for recycled products."

In addition to the strategic goal of reducing hazardous material use, the memorandum listed six specific objectives. The F-5 Pollution Prevention Management Program, and Plan are intended to implement Objective 2: Reduce the use of hazardous materials in existing (deployed) weapons systems by finding less hazardous materials and processes and integrating them into TOs, MILSPECS and MILSTDS. OPR: AF/LG; OCRs: SAF/MI, AF/CE, AF/SG, AF/XO, AFMC.

- 4. Methodology. The F-5 Pollution Prevention Management Plan was developed in the following stages.
- a. Analysis of the technical order data base. An initial "quick look" review of F-5 technical orders was conducted by Capt Gavern in early May. Of 181 technical orders which were scanned, 118 were identified as definitely not requiring additional analysis, and 63 technical orders were flagged as requiring some level of additional, in-depth, analysis. Capt Gavern has conducted a line-by-line analysis of five of those technical orders. Potential hazardous materials identified in the F-5A, and F-5B Powerplant technical orders will be the subject of this first management plan.
- b. Creation of a F-5 specific hazardous materials management data base. Each occurrence of a potential hazardous material was entered into a spreadsheet data base to facilitate further analysis. Printouts of the two powerplant spreadsheets are attached to this document (Appendix A).

- c. Compilation into a management plan. Occurrences of potential hazardous materials have been initially screened into management categories using this criteria.
- a. Special Management. This category includes compound hazards, for example, materials or chemicals which are both nuclear hazards and hazardous materials; or explosive hazards and hazardous materials.
- b. Operational Management. This category includes materials and chemicals which have been identified as a significant individual or environmental risk, or which require special emphasis. They require a rapid response. Suitable substitutes, or a plan for acquiring a suitable substitute should be developed within six months of identification.
- c. Tactical Management. This category includes materials and chemicals which have been identified as a moderate individual or environmental risk. They require identification of suitable substitutes or a plan for acquiring such substitutes within one year of identification.
- d. Strategic Management. This category includes materials and chemicals which have been identified as low individual or environmental risks. They require identification of suitable substitutes or a plan for acquiring such substitutes within two years of identification.
- e. Minimum Management. This category includes materials and chemicals which are identified in F-5 aircraft technical orders but which are not considered hazardous materials at this time. These materials have been identified. and will continue to be tracked for a number of reasons. First, there are numerous examples of materials and chemicals which had been identified as harmless, but which were later identified as causing problems. Tracking all of the materials on the F-5 makes it easier to screen for such materials as they become issues. Second, within the pollution prevention community itself, criteria used to identify hazardous materials have been changing. In the past, emphasis has centered on carcinogenic risk. As broader criteria are used to determine what constitutes a hazard, more refined management categories may be required. Once again, having all of the materials tracked makes such screening more efficient and effective. Finally, managing all of the materials on a program allows us to take advantage of new technology, or product improvements. For example, there are numerous instances where petroleum jelly is used to lubricate gaskets on various components of the F-5. Suppose we are able to identify a new lubrication product which costs significantly less, or performs better, or lasts longer, or does not use petroleum

products; or a gasket material is developed which is self-lubricating. If we have identified all occurrences of the use of petroleum jelly, making the substitution, and changing the technical orders can be accomplished much more rapidly.

- d. Technical risk analysis. This first management plan is intended to highlight specific occurrences that will need to be analyzed. In the future, updated plans will include the results of technical risk analysis.
- e. Identification of related research. A number of organizations will be contacted to identify hazardous materials replacement research efforts currently underway which may relate to or be useful for the F-5 program.
- f. Automation issues. Data identified in this first review was obtained through a "by-hand" analysis of the two technical orders. For the 65 technical orders identified to date as requiring additional evaluation, two automation categories were created. The first consists of technical orders which would be difficult to review by hand, either because of the numbers of potential occurrences, or because of the size of the technical order. The second consists of those technical orders which require additional analysis, but which need not be automated, given that a "by hand" analysis is accomplished. (Appendix B)
- 5. Results. Five major categories for "hazardous materials" management have been identified, ranging from the most serious to the least serious management problems.
- a. Special Management. This category includes compound hazards, for example, materials or chemicals which are both nuclear hazards and hazardous materials; or explosive hazards and hazardous materials. At this time, no compound hazards have been identified for this program.
- b. Operational Management. This category includes materials and chemicals which have been identified as a significant individual or environmental risk, or which require special emphasis. This category presently includes ozone layer depleting substances (OLDS) and the EPA 17 (Appendix C). At this time, the following hazardous materials have been identified for Operational Management:

	Chemical	Identified as	Military designation	Technical Order	Page number	Line number
1.		vapor degrease		1F-5A-2-6	3-148	9
2.				1F-5B-2-6	3-179	6

3.		solvent	P-D-680 type II	1F-5A-2-6	5-8	25
4.				1F-5B-2-6	5-6	29
5.		solvent	P-D-680 type II	1F-5A-2-6	5-18	12
6.				1F-5B-2-6	5-17	18
7.		degreasing solvent	O-T-634	1F-5A-2-6	5-19	24
8.				1F-5B-2-6	5-19	26
9.		carbon remover compound	MIL-C- 25107	1F-5A-2-6	5-19	27
10.				1F-5B-2-6	5-19	28
11.		carbon remover compound	MIL-C- 25107	1F-5A-2-6	7-13	30
12.				1F-5B-2-6	7-13	25
13.		cleaning fluid	P-C-111	1F-5A-2-6	5-19	31
14.				1F-5B-2-6	5-19	33
15.		cleaning fluid	P-C-111	1F-5A-2-6	7-13	35
16.				1F-5B-2-6	7-13	28
17.		solvent	P-D-680 Type II	1F-5A-2-6	6-12	13
18.				1F-5B-2-6	6-11	18
19.	trichloro- ethylene	tric	O-T-634	1F-5A-2-6	7-10	12
20.	trichloro- ethane		O-T-620	1F-5B-2-6	7-8A	3
21.		degreasing solvent	O-T-634	1F-5A-2-6	7-13	27
22.			O-T-620	1F-5B-2-6	7-13	20
23.		solvent	P-D-680 Type II	1F-5A-2-6	8-4A	30
24.				1F-5B-2-6	8-4	24
25.		solvent	P-D-680 Type II	1F-5A-2-6	13-12A	40
26.				1F-5B-2-6	11-21	?

27.	solvent	P-D-680 Type II	1F-5A-2-6	13-14	25
28.			1F-5B-2-6	13-13	11
29.	solvent	P-D-680 Type II	1F-5A-2-6	13-20	19
30.			1F-5B-2-6	13-19	37
31.	solvent	P-D-680 Type II	1F-5A-2-6	13-21	42
32.			1F-5B-2-6	13-21	25
33.	solvent	P-D-680 Type II	1F-5A-2-6	13-23	25
34.			1F-5B-2-6	13-22A	12
35.	solvent	P-D-680 Type II	1F-5A-2-6	13-25	36
36.		1 - 7	1F-5B-2-6	13-26	10
37.	solvent	P-D-680 Type II	1F-5A-2-6	13-28	17
38.			1F-5B-2-6	13-27	24
39.	zinc chromate putty	MIL-P-8116	1F-5A-2-6	14-4	33
40.			1F-5B-2-6	14-4	29
41.	zinc chromate putty	MIL-P-8116	1F-5A-2-6	14-6	30
42.			1F-5B-2-6	14-7	10
43.			1F-5B-2-6	14-9	18

c. Tactical Management. This category includes materials and chemicals which have been identified as a moderate individual or environmental risk. At this time, the following hazardous materials have been identified for Tactical Management:

	Chemical	Identified as	Military designation	Technical Order	Page number	Line number
1.		preservative		1F-5A-2-6	3-100	9
2.				1F-5B-2-6	3-103	9
3.		calibration fluid	MIL-F- 7024	1F-5A-2-6	3-100L	13
4.				1F-5B-2-6	3-114	13

5.	insulation blanket	1F-5A-2-6	4-4	21
6.		1F-5B-2-6	4-5	21
7.	insulation blankets and shrouds	1F-5A-2-6	12-12	17
8.		1F-5B-2-6	12-12	16
9.		1F-5B-2-6	12-12	34

- d. Strategic Management. This category includes materials and chemicals which have been identified as low individual or environmental risks. At this time, there are no materials or chemicals identified for Strategic Management.
- e. Minimum Management. This category includes materials and chemicals which are identified in F-5 aircraft technical orders but which are not considered hazardous materials at this time. The following chemicals and materials were identified:
 - 1. hydraulic fluid
 - 2. petrolatum
 - 3. lubricating oil
 - 4. spray lube
 - 5. graphite grease
 - 6. antiseize compound
 - 7. solid film lubricant
 - 8. high temperature sealant
 - 9. WD-40
 - 10. Rust Lick
 - 11. grease
 - 12. sealing compound
 - 13. milk of magnesia

6. Metrics.

- a. Summary Statistics. Technical Order 1F-5A-2-6 has 704 pages, and 1F-5B-2-6 has 709 pages. Those 1,413 pages were reviewed by hand. 120 materials and chemicals were listed in 1F-5A-2-6, and 123 chemicals and materials were listed in 1F-5B-2-6 as used on the F-5 aircraft.
- b. Category Statistics.

- 1. Special Management. No chemicals or materials were identified for special management.
- 2. Operational Management. 43 chemicals and materials were identified for operational management. Life cycle cost and other resource requirements have not been identified to date.
- 3. Tactical Management. Nine chemicals and materials were identified for tactical management.
- 4. Strategic Management. No chemicals and materials were identified for strategic management.
- 5. Minimum Management. 13 types of chemicals and materials were identified for minimum management.
- c. Existing Non Hazardous Alternatives. During the next quarter, the chemicals and materials identified for operational management will be screened to determine is a non hazardous alternative is available for each chemical or material for each separate process. Results of the screening will be documented in the next quarterly report.
- d. Existing Acquisition Development Efforts. In the event that a non-hazardous alternative is not available, existing efforts to develop an environmentally sound alternative will be identified. For example, there is an Air Force wide halon replacement program.
- e. New Acquisition Development Efforts. If no such development effort exists, the F-5 Program Office will initiate a project to develop an alternative.
- 7. F-5 Pollution Prevention Plan Manager. The point-of-contact for the F-5 Pollution Prevention Management Plan is Capt Janice M. Gavern, SA-ALC/LAV, Kelly AFB, Texas. She can be reached during the week at DSN 785-9750, commercial (513) 255-9750, FAX 986-4511 or (513) 476-4511.
- 8. Summary. This is the first issue of the quarterly F-5 Pollution Prevention Management Plan. It details the initial identification of potential hazardous materials which will eventually be eliminated from use on the F-5 weapon system. Subsequent quarterly plans will describe additional analysis, and identification and replacement of the hazardous materials with environmentally sound alternatives.

Definitions

Alternatives. Ways of reducing adverse effects of HAZMATs. Alternatives, as applied to HAZMAT decision-making include, but are not limited to, such possibilities as substituting less hazardous or nonhazardous material; redesigning a component such that the HAZMAT is not needed in its manufacture, use, or maintenance; modifying processes or procedures; restricting users; consumptive use; on-demand supply; direct ordering; extending shelf life; regenerating spent material; downgrading and reuse of spent material; use of waste as raw material in other manufacturing and combinations of those factors. Alternatives are to be analyzed in a "could cost" approach, considering what the lowest amount the decision could cost by overcoming barriers to getting the job done, while ensuring protection of human health and the environment.

Hazardous Materials. A system-related material is considered hazardous in the context of a Hazardous Materials Management Program if available information states or suggests that the material itself, or any of its ingredients, poses a significant potential hazard in any of these seven categories: acute health, chronic health, cancer, contact, flammability, reactivity or environmental, or data is insufficient to determine that a significant potential hazard does not exist in any of these categories, and the material is used in sufficient quantity to allow that potential hazard to be realized.

Hazardous Materials Management Program Plan. A description of the planned tasks and activities to be used by the Program Manager to implement the system Hazardous Materials Management Program. It is the Hazardous Materials Management Program Manager's approach to assure appropriate consideration is given to the reduction/elimination of hazardous materials from system(s), system components, and associated support items. The emphasis is on eliminating or reducing hazardous materials in system processes and products.

Hazardous Materials Life Cycle Costs. Those costs that are incurred by the government due to the use of hazardous materials. Typical costs include procurement, disposal, personnel protection, medical surveillance, facilities, transportation and toxic torts.

Hazardous Wastes. By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed; possesses at least one of five characteristics (toxic, corrosive, ignitable, explosive, or chemically reactive) or are listed in 40 CFR 261-3 or applicable state or local waste management regulations.

Ozone Depleting Chemicals (ODCs). Chemicals that, when released into the atmosphere, result in the destruction of the earth's stratospheric ozone layer. They include Chlorofluorocarbons (CFCs), halons, and other substances as classified by the Clean Air Act of 1990. The term is synonymous with ODS (Ozone Depleting Substance) and OLDS (Ozone Layer Depleting Substance).

Pollution Prevention. All the actions necessary, to include use of processes, practices, products or management actions, that eliminate or reduce undesirable impacts on human health and the environment. These actions form a hierarchy of source reduction, recycling, treatment, and disposal.

References

Air Force Regulation (AFR) 19-1, Pollution Abatement and Environmental Quality, January, 1978.

AFR 19-7, Environmental Pollution Monitoring, April, 1985.

AFR 19-8, Environmental Protection Committees and Environmental Reporting, August, 1988.

AFR 19-9, Interagency/Intergovernmental Coordination of Land, Facility Environmental Plans, Programs and Projects, February, 1986.

AFR 19-15, Reduction in Use of Chlorofluorocarbons, Halons, and Other Substances that Deplete Stratospheric Ozone, 30 Sep 91.

Department of Defense Directive (DODD) 4210.15, Hazardous Material Pollution Prevention, 27 Jul 89.

DODD 5000.1, Major and Non-Major Defense Acquisition Programs, Feb 91.

DODD 6050.1, Environmental Effects in the United States of DOD Actions, XXXX.

Department of Defense Instruction (DODI) 5000.2, Defense Acquisition Management Policies and Procedures, Feb 91.

DODI 5000.2M, Defense Acquisition Management Documentation and Report, Feb 91.

Department of Defense Manual (DODM) 6050.5M, DOD Hazardous Materials Information System Procedures., XXXX.

Military Standard (MIL-STD) 337, Design to Cost, XXXX.

MIL-STD-499A, Systems Engineering, XXXX.

MIL-STD-882, Systems Safety Program Requirements, XXXX.

MIL-STD-1388-1A, Logistics Support Analysis, XXXX.

MIL-STD-13882B, DOD Requirements for a Logistic Support Analysis Record, XXXX

MIL-STD-1521B, Technical Reviews and Audits for Systems, Equipment and Computer Programs, XXXX.

Secretary of the Air Force Memorandum, Air Force Pollution Prevention Program, 7 January 1993.

Appendix A

The F-5A and F-5B Pollution Prevention Management spreadsheets.

Basic: 1 May 1971 through Change 15: Chemical Known As Comm hydraulic fluid Comment: Maintenance personnel use						
Chemical Known hydrauli Comment: Maintenance P	Change 15: 1 March 1986	• •				
Comment: Maintenance p	Comm	Military Name MIL-H-83282 or MIL-H-5606	Reference	FSN	Page 1-46	Line 31
Comment: Personnel may be petrolatum	Comment: Maintenance personnel use a hydraulic te Comment: Personnel may be exposed to spillage.	a hydraulic test stand to provide external hydraulic power tto operate the various aircraft sy o spillage.	rternal hydraulic	power tto operate t	the various 2-4	aircraft sy 24
Comment: Apply to preformed packings.	med packings. ing oil	MIL-L-7808 1.O. 4282-1-1 2-4 27	1.0. 4282-1-1	which preformed c	2-4 packings m	27 aust pass.
Comment: Lubricate packing grooves, Comment: Page 2-4A and 2-5 contain comments are partitived.	Lubricate packing grooves, lead-in chamiers, botes, units or Page 2-4A and 2-5 contain a chart listing engine lubricants.	engine lubricants.	1.0.21-385-66-1		3-100	<u> </u>
Comment: Ensure that the engine has b	that the engine has been preserved	neen preserved before removal of quick engine change components. MIL-F-7024	quick engine cho	nge components.	3-1001	13
Comment: If fuel flowmeter is	Comment: If fuel flowmeter is to be stored, ensure that flowmeter is filled with calibration fluid to protect internal parts. FSN 9150-754-0064 3-103	rt flowmeter is filled wi	th calibration flui	d to protect interna FSN 9150-754-0064	3-103	<u></u>
Comment: Lubriciate frungare	Ξ Ø	Bond spray lube. MIL-G-21164		3-110	3-110	
(A COOH indire	MII -1 -23308			111-5	2
Comment: Lubricate preformed packin	ormed packing groove and ling oil	g groove and inner surface of right half (of slip-joint coupler) with Lubril-Cond A. 3-116	half (of slip-joint	coupler) with Lubril-	Cond A. 3-116	∞
Comment: Coat all afterburner affach	Il afterburner attach bolts with lubricating oil.	icating oil. imp)		FSN 8030-180-6315		91
Comment: Before Installing me	Comment: Before installing manifold, coat attach bolt threads with Jet-Lube SS-30 (Hi-Temp)	of threads with Jet-Lub VV-P-236	se SS-30 (Hi-Temp	∴	3-121 3-127	88
Comment: Lubricate preformed packin	ormed packing (on fuel flow stum	ig (on fuel flowmeter transmitter) with petrolatum. VV-P-236	th petrolatum.		3-129	8
Comment: Lubricate seals (on fuel inlet oil oil comment: Lubricate remote speed col	Comment: Lubricate seals (on fuel inlet manifold mounting MIL Oil Comment: Lubricate remate speed control cables with oil	manifold mounting stuck) with petrolatum. MIL-L-25681 atrol cables with oil.	olatum.		3-132	4

Time Indiv Risk										
Quantity Time										
Crew Size										
Type of Operation	ورافدرماورها	lubrication		lubrication	lubrication	lubrication	lubrication	subrication subrication subrication	lubrication	lubrication
Other 'Suitable Substitutes':										
Current Practice is to use:	stems.									

Chemical	Known As Commercial Name Militar	Military Name	Reference	FSN	Page	Line
	vapor degrease		1.0. 23-1-13		3-148	0
Comment:	Comment: Vapor degrease parts in accordance with Process 1, T.O. 2J-1-13.	s 1, T.O. 2J-1-	13.			
	acetone O-A-51	13			3-148	27
Comment:	Comment: Rinse parts in clean reagent grade acetone, and air dry.	l air dry.	-	-		
	solid film lubricant		·	FSN 9150-964-9228 3-148	3-148	32
Comment:	Comment: Use Solid Film Lubricant to lubricate parts.			FSN 9150-964-9244		
			T.O. 1F-5A-3		3-152	2
Comment:	Comment: The engine bay firewalls must be cleaned at prescribed intervals to prevent buildup of residue.	cribed intervo	its to prevent built			
	high-temperature sealant		T.O. 1F-5A-3		3-152	7
Comment:	Comment: If any firewall access panels are removed the panels must be resealed with high-temperature sealant.	nels must be r	esealed with high	-temperature sealar	÷	
	Rust-Lick No. 606		1.0. 21-1185-102		3-153	9
Comment:	Comment: Clean the engine compressor section using reverse Rust-Lick and water-wash.	se Rust-Lick ar	nd water-wash.			
	corrosion prevWD-40		1.0. 2J-J85-102		3-153	2
Comment:	Comment: Use only WD-40 or Rust-Lick No. 606 to preserve engine. Do not mix WD-40 and Rust-Lick.	ngine. Do not	mix WD-40 and I	Aust-Lick.		
	insulation blanket				4-4	21
Comment:	Comment: This is the compressor casing insulation blanket.		•			
	antiseize com Ease-Off 990			FSN 8030-664-6146	4-44	•
	graphite silicone grease MIL-A-907	-907		FSN 9150-735-1800	4-44	7
Comment:	Comment: Lubricate threads on flexible drive shaft coupling nuts with antiseize compound or graphite silicone grease	nuts with anti	seize compound	or graphite sticone g	rease.	
	Oil MiL-L-7808	.7808			5-8	æ
Comment:	Comment: All line fittings on fuel control should be lubricated with oil.	d with oil.				
	solvent P-D-68	P-D-680 Type II			5-8	25
Comment:	=	ith P-D-680 Tyl	oe II pressurized a	rt 25 psig with shop a	<u>ن</u> ـ	
	grease Plasti-lube Moly No.3			150-823-0845	28	ج ج
Comment:	Comment: Lubricate pump splined shaft and gearbox axis D internal spline sparingly with grease	internal spline	e sparingly with g	rease.		
	antiseize compound MIL-T-5544	5544			5.8 5.8	37
Comment:	Comment: Lubricate threads of the four studs on engine gearbox mounting pad with antiseize compound.	urbox mountir	g pad with antise	vize compound.		
	antiseize compound MIL-T-5544	5544			5-10	14
Comment:	Comment: Lubricate threads of fuel inlet manifold mounting studs with antiseize compound	studs with an	iseize compound			
	petrolatum VV-P-236	236	,		5-10	9
Comment:	Comment: Lubricate fuel inlet manifold seals with petrolatum.	÷				
	petrolatum VV-P-236	236	•••		5-10	ઋ
Comment	Comment: Lightly lubricate the three preformed packings (on the main fuel pump) with petrolatum.	n the main fu	ed thiw (dmud le	trolatum.		

61

Indiv Risk								-								
Time																
Quantity Time						4 ozs										
Crew Size				···												
Type of Operation cleaning	cleaning	lubrication	cleaning	reseating	cleaning	preserving	maintenance	Lubrication Lubrication	lubrication	cleaning	lubrication	lubrication	lubrication	lubrication	lubrication	
Other "Suitable Substitutes":							-						~~~			
Current Practice is to use:								62	-							

Chemical	Known As Commercial Name	Military Name	Reference	FSN	Page	line
	antiseize compound	MIL-T-5544	···		5-10	30
Comment:	Comment: Lubricate studs (for the main fuel pump) with antiseize compound	h antiseize compou	nd.			
	petrolatum		****		\$-10A	7
Comment:	Comment: Lubriciate packing (for the high pressure rel	high pressure relief valve cover) with petrolatum before installation.	petrolatum befa	ore installation.		
	antiseize com/Ease-Off 990			FSN 8030-664-6146	5-11	15
	graphite silicone grease	MIL-A-907			511	91
Comment:	Comment: Lubricate threads on the four bolts (on the	main fuel nozel) wit	th antiseize comp	main fuel nozzel) with antiseize compound or graphite silicone grease.	cone grea	93
	petrolatum	W-P-236			5-13	35
Comment:	Comment: Lubricate preformed packing (main fuel control filter) with petrolatum.	ntrol filter) with petro	olatum.			•
	10	MIL-L-7808			5-13	37
Comment:	Comment: Apply oil to threads of access plug (main fuel control filter).	el control filter).				
	petrolatum	W-P-236			5-15	01
Comment:	Comment: Lubricate new preformed packing (main fuell lpump filter) with petrolatum.	ell lpump filter) with	petrolatum.			
	io	MIL-L-7808			5-15	12
Comment:	Comment: Apply oil to threads of cap and spring asser	and spring assemble on the main fuel pump fitter.	el pump filter.			
	solvent	P-D-680 Type II			5-18	12
Comment:	Comment: Using solvent P-D-680 pressurtzed at 25 psi with shop air, blast-flush internal splines on the overspeed governor.	ith shop air, blast-flu	sh internal spline	s on the overspeed g	governor.	
	grease Prostilube Moly No. 3	•	•	FSN 9150-823-8045	5-18	78
Comment:	Comment: Lubricate mating splines on governor and gearbox with grease.	pearbox with grease	_•			
	degreasing solvent	0-1-634			5-19	24
Comment:	Comment: This procedure uses an uttrasonic cleaning unit. If one is not available, clean filter elements in accordance with T.O. 2J-1	unit. If one is not av	allable, clean filt	er elements in accor	dance with	1.0.21
Comment:	Clean filter parts except preformed packings and filter element by washing in degreasing solvent	35 and filter element	by washing in d	egreasing solvent.		
Comment:	This procedure also applies to the oil filter parts.	arts.				
	carbon remover compound	MIL-C-25107			5-19	27
Comment:	Comment: Soak filter element for 30 minutes in carbon remover compound before placing element in ultrasonic cleaning unit.	remover compound	d before placing	element in uttrasonic	c cleaning	5
Comment:	This procedure also applies to the oil filter element.	ement.			7-13	8
	cleaning fluid	P-C-111	•		5-19	31
		P-C-436			5-19	31
Comment:	Comment: Place filter element into steel basket in ultrasonic cleaning tank for one hour.	sonic cleaning tank	for one hour.			
Comment:	Comment: This procedure applies to the main fuel control filter and to the main fuel pump filter.	trol filter and to the	main fuel pump	∰er.		
Comment:II	Comment:It also applies to the afferburner high-pressure filter and the afferburner fuel control filter.	e filter and the after	tourner fuel confi	ol filter.		
Comment:	Comment: It also applies to the oil fitter element.				7-13	35
	solvent	P-D-680 Type II			6-12	13
Comment	Comment: Use P-D-680, cressurized at 25 psia, to blast-	flush internal solines	on the offerbur	25 psia, to blast-flush internall splines on the afferburner fuel control and purms assembly	Hesse during	Adu

Current Practice is to use:	Other "Suitable Substitutes":	Type of Operation lubrication	Crew Size	Quantity Time	Time	Indiv Risk	
	-	lubrication					
		lubrication lubrication					
		Lubrication	77	· ·•= = =·			
		lubrication					
		lubrication		<u>.</u>			
		lubrication					
		cleaning					
		lubricate					
		cleaning					
		cleaning					
		cleaning					
		cleaning					

FSN 9150-823-8045 Ir internal apline with greatsembly with petrolatum. Sound. I with oil. I with oil.	Chemical	Known As	Commercial Name	Military Name	Reference	FSN	Page	Line
Comment: All tine fittings on the fuel control should be lubricated with oil. Greace Plastitube May No. 3 Comment: Lubricate driebument by the performant and general performant by the performant of the pump spined shart and general compound VV-P.236 Comment: Lubricate preformed pocking seal on afferbumer the control and pump assembly with performant configuration in antiseize compound VV-P.236 VV-P.2		≅.		MIL-L-7808			6-12	32
comment: Lubricate affectumer fuel pump splined short and gearbox axis E straftgear internal apline with grease. Comment: Lubricate preformed packing seal on affectumer fuel control and pump assembly with petrolarum. Lubricate preformed packing seal on affectumer fuel control and pump assembly with petrolarum. Lubricate preformed packing seal on affectumer fuel pump with petrolarum. Lubricate fuel international movinities acrompound. VVP-236 Comment: Lubricate fuel international movinities are compound. Online petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel pump with petrolarum. Online attack for the affectumer fuel control fifter. Online attack for the affectumer fuel control fifter. Online attack for the affectumer fuel for the affectumer fuel control fifter. Online attack for affectumer fuel for the affectumer fuel	Comment:	All line fittings on the	fuel control should be	lubricated with oil.				
Comment: Lubricate offeetumer fuel pump splined short and gearbox axis £ startigear internal opiline with grease. Comment: Lubricate preformed packing seal on affectuar fuel control and pump assembly with petrolatum. Comment: Lubricate preformed packing seal on affectuar fuel control and pump assembly with petrolatum. VAP-236 Comment: Lubricate threads of fuel inter manifold mounting studs with antisetse compound. Comment: Lubricate threads of fuel international mounting studs with antisetse compound. VAP-236 Comment: Lubricate preformed packings on affebtumer fuel pump with petrolatum. VAP-236 Comment: Lubricate preformed packings for the affebtumer high-pressure fifter with petrolatum. VAP-236 Comment: Lubricate preformed packings for the affebtumer high-pressure fifter with petrolatum. VAP-236 Comment: Lubricate preformed packings for the affebtumer fuel control fifter. VAP-236 Comment: Lubricate preformed packing for the affebtumer fuel control fifter. Apply of to threads of affebtumer high-pressure fifter with petrolatum. VAP-236 Comment: Lubricate threads of access plug for the affebtumer fuel control fifter. MIL-17808 Comment: Lubricate threads of all coupling ruts for the affebtumer fuel control fifter. MIL-17808 Comment: Lubricate threads or affebtumer main sproybor with oil. MIL-17808 Comment: Lubricate threads on affebtumer main sproybor with oil. MIL-17808 Comment: Lubricate threads on affebtumer main sproybor with oil. All 1-17808 Comment: Lubricate macuniting studs on engine gearbox and oil boths and screws to be installed with the oil reservoir and oil pump or petrol in units. AND 220 Comment: Lubricate macuniting studs on engine gearbox and oil boths and screws to be installed with the oil reservoir and oil pump or petrol in units.		grease	Plastilube Moly No. 3			FSN 9150-823-8045	6-12	35
Comment: Lubricate preformed pocking sea on afterburner fuel control and pump assembly with petrolatum. Comment: Lubricate preformed pocking sea on afterburner fuel control and pump assembly with petrolatum. Lubricate threads of fuel links manifold mounting studs with antiseize compound. Comment: Lubricate threads of fuel links manifold seals with petrolatum. VV-P.236 Comment: Lubricate preformed pockings on afterburner fuel pump with petrolatum. VV-P.236 Comment: Lubricate preformed pockings on afterburner fuel pump with petrolatum. VV-P.236 Comment: Lubricate preformed pockings for the afterburner fuel pump with petrolatum. VV-P.236 Comment: Lubricate preformed pockings for the afterburner fuel control filter with petrolatum. Oil NV-P.236 Comment: Lubricate preformed pocking for the afterburner fuel control filter. Oil NV-P.236 Comment: Lubricate new preformed pocking for the afterburner fuel control filter. Oil NV-P.236 Comment: Lubricate hareads of all coupling ruts for the afterburner fuel control filter. Oil NV-P.236 Comment: Lubricate threads of all coupling ruts for the afterburner fuel manifold with oil. Oil NV-P.236 Comment: Lubricate threads of all coupling ruts for the afterburner fuel manifold with oil. Oil NV-P.236 Comment: Lubricate threads or afterburner main spraybor with oil. Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil Oil Oil NV-P.236 Comment: Lubricate threads on afterburner main spraybor with oil. Oil	Comment:	Lubricate afferbume	r fuel pump splined sho	art and gearbox axis	E shaffgear inter	nal apline with grea		
Comment: Lubricate preformed packing seal on affeburner fuel control and pump assembly with petrolaturn. Comment: Lubricate preformed packing seal on affeburner fuel pump with antisetee compound. VV-P-236 Comment: Lubricate thereads of fuel fuel manifold seals with petrolaturn. petrolaturn Intercate preformed packings on affeburner fuel pump with nitisates compound. VV-P-236 Comment: Lubricate preformed packings for the affeburner fuel pump with antisates compound. VV-P-236 Comment: Lubricate preformed packings for the affeburner high-pressure fifter with petrolaturn. VV-P-236 Comment: Lubricate preformed packings for the affeburner high-pressure fifter with petrolaturn. Oil MILL-7808 Comment: Lubricate new preformed packing for the affeburner fuel control fifter with petrolaturn. Oil MILL-7808 Comment: Lubricate new preformed packing for the affebrurner fuel control fifter with petrolaturn. Oil MILL-7808 Comment: Lubricate threads of all coupling ruts for the affebrurner fuel control fifter with petrolaturn. Oil MILL-7808 Comment: Lubricate threads of all coupling ruts for the affebrurner fuel manifold with oil. MILL-7808 Comment: Lubricate threads on affebrurner main sproybor with oil. Oil MILL-7808 Comment: Lubricate threads on affebrurner main sproybor with oil. Oil MILL-7808 Comment: Lubricate threads on affebrurner main sproybor with oil. Oil All All All All All All All All All A	-	petrolatum		VV-P-236	,	,	6-12	38
comment: Lubricate treads of fuel inter manifold mounting studs with antisetse compound. VAP-236 VAP-236 VAP-236	Comment:	Lubricate preformed	packing seal on after	ourner fuel control a	nd pump assemb	oly with petrolatum.		
Comment: Luchicate threads of fuel inlet manifold mounting studs with antiseize compound. VVP-236 Comment: Luchicate fuel inlet manifold seds with perfortum vVP-236 Comment: Luchicate preformed packings for the afferburner high-pressure filter with perfortum vVP-236 Comment: Luchicate preformed packings for the afferburner fuel control filter with perfortum vVP-236 Comment: Luchicate preformed packing for the afferburner fuel control filter with perfortum vVP-236 Comment: Luchicate new preformed packing for the afferburner fuel control filter with perfortum virtumicate new preformed packing for the afferburner fuel control filter virtumicate new preformed packing for the afferburner fuel control filter virtumicate new preformed packing for the afferburner fuel control filter virtumicate new preformed packing for the afferburner fuel control filter virtumicate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. virtumicate threads or all coupling nuts for the afferburner pilot fuel manifold with oil. virtumicate threads on afferburner main spraybar with oil. virtumicate threads on afferburner pilot spraybar with oil. virtumic		antiseize com	punod	MIL-T-5544		•	6-13	39
Comment: Lubricate treat intermalidal seats with patrolatum. Comment: Lubricate preformed packings on afferburner fuel pump with petrolatum. Comment: Lubricate preformed packings on afferburner fuel pump with petrolatum. Comment: Lubricate studs for the afferburner fuel pump with petrolatum. Comment: Lubricate preformed packings for the afferburner high-pressure filter with petrolatum. Comment: Lubricate preformed packings for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Comment: Lubricate threads of all coupling ruts for the afferburner fuel control filter. Comment: Lubricate threads of all coupling ruts for the afferburner fuel manifold with all. Comment: Lubricate threads on afferburner main spraybar with all. Comment: Lubricate threads on afferburner main spraybar with all. Comment: Lubricate threads on afferburner main spraybar with all. Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with all. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with the all reservoir and all pump w. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with the all reservoir and all pump w. All:L-7808 Comment: Lubricate threads on afferburner pilot spraybar with the all reservoir and all pump w.	Comment:	Lubricate threads of	fuel inlet manifold mov	inting studs with anti	seke compound			
Comment: Lubricate fuel inlet manifold seals with petrolarum. VV-P-236 Comment: Lubricate preformed packings on afterburner fuel pump with petrolarum. VV-P-236 Comment: Lubricate preformed backings on afterburner fuel pump with antiseize compound. VV-P-236 VV-P-		petrolatum		VV-P-236	•		6-13	4
Comment: Lubricate preformed packings on afferburier fuel pump with petrolatum. VV-P-236 Petrolatum VV-P-236 Comment: Lubricate structs for the afferburier fuel pump with antisetze compound. Petrolatum VV-P-236 Comment: Lubricate preformed packings for the afferburier fuel comment: Lubricate preformed packings for the afferburier fuel control filter with petrolatum. VV-P-236 Comment: Apply of to threads of afferburier fuel control filter with petrolatum. VV-P-236 Comment: Lubricate new preformed packing for the afferburier fuel control filter. VV-P-236 Comment: Lubricate new preformed packing for the afferburier fuel control filter. VV-P-236 Comment: Lubricate new preformed packing for the afferburier fuel control filter. Mil1-7808 Comment: Lubricate fire acds of all coupling nuts for the afferburier main fuel manifold with oil. VI-P-236 Comment: Lubricate fire acds of all coupling nuts for the afferburier main fuel manifold with oil. VI-P-236 Comment: Lubricate fire acds or afferburier main spraybor with oil. VI-P-236 Comment: Lubricate fire acds on afferburier main spraybor with oil. VI-P-236 Comment: Lubricate fire acds on afferburier main spraybor with oil. VI-P-236 Comment: Lubricate main spraybor oil both stand screws to be installed with the oil reservoir and oil both spraybor with oil.	Comment:	Lubricate fuel inlet m	anifold seals with petro	Matum.				
Comment: Lubricate preformed packings on afferburner fuel pump with petrolatum. Comment: Lubricate studs for the afferburner fuel pump with natisates compound. Comment: Lubricate studs for the afferburner fuel pump with natisates compound. Comment: Lubricate studs for the afferburner high-pressure filter with petrolatum. Comment: Lubricate preformed packings for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter. Comment: Lubricate new preformed packing for the afferburner fuel control filter. Comment: Lubricate new preformed packing for the afferburner fuel control filter. Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Comment: Lubricate threads of all coupling ruts for the afferburner pilot fuel manifold with oil. Comment: Lubricate threads on afferburner main spraybar with oil. Comment: Lubricate threads on afferburner pilot spraybar with oil. Comment: Lubricate macuniting studs on engine gearbox and oil boths and screws to be installed with the oil reservoir and oil prump works petrol: Lubricate exist preformed to be installed with the oil reservoir and oil prump works petrol: Lubricate exist preformed to be installed with the oil reservoir and oil prump works. Comment: Lubricate exist preformed to be installed with the oil reservoir and oil prump works. Comment: Lubricate exist preformed be petrol: Lubricate exist preformed beaution to be installed with the oil reservoir and oil prump works. Comment: Lubricate exist preformed beaution to be installed with the oil reservoir and oil prump works. Comment: Lubricate exist preformed beaution to be installed with the oil reservoir and oil prump works. Comment: Lubricate exist preformed beautifuel to be installed. Comment Comment Comment Comment Comment Comment Comment Comment Comme		petrolatum		VV-P-236			6-14	8
Comment: Lubricate study for the afterburner fuel pump with antiseize compound. Comment: Lubricate study for the afterburner fuel pump with antiseize compound. Comment: Lubricate preformed packings for the afterburner fuel control filter with petrolatum. Comment: Lubricate preformed packing for the afterburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afterburner fuel control filter. Comment: Lubricate new preformed packing for the afterburner fuel control filter. Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. All-1-7808 Comment with part oil representation to be instanted thread	Comment:	Lubricate preformed	packings on afferbur	er fuel pump with p	etrolatum.			
Comment: Lubricate studs for the afferburner fuel pump with antiseize compound. VV-P-236 VV-P-		antiseize com	punod	MIL-F-5544			6-14	8
Comment: Lubricate preformed packings for the afferburner high-pressure filter with petrolatum. Comment: Apply oil to threads of afferburner high-pressure filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afferburner fuel control filter. Comment: Lubricate new preformed packing for the afferburner fuel control filter. Comment: Lubricate threads of all coupling nuts for the afferburner main fuel manifold with oil. Comment: Lubricate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. Comment: Lubricate threads on afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate major afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate major afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate major afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate major afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate major afferburner pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil. All L-7808 Comment: Lubricate with pilot spraybar with oil reservoir and oil pulp with oil pulp with oil reservoi	Comment:	Lubricate stucks for th	e afferburner fuel pum	p with antiseize con	ponud.			
Comment: Lubricate preformed packings for the antherburner high-pressure fitter with pertodatum. Comment: Apply oil to threads of afferburner high-pressure fitter head. Comment: Lubricate new preformed packing for the afferburner fuel control fitter with pertolatum. Comment: Lubricate new preformed packing for the afferburner fuel control fitter. Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Comment: Lubricate threads on afferburner main spraybar with oil. Comment: Lubricate threads on afferburner main spraybar with oil. All-L-7806 Comment: Lubricate threads on afferburner main spraybar with oil. All-L-7806 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7806 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7806 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7806 Comment: Lubricate main structed main spraybar with oil. All-L-7806 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7806 Comment: Lubricate main structed main spraybar with oil. All-L-7806 Comment: Lubricate main structed main spraybar with oil. All-L-7806 Comment: Lubricate main structed main spraybar with oil. Comment: Lubricate main structed main spraybar with oil. All-L-7806 Comment: Lubricate main structed main spraybar with oil. All-L-7806 Comment: Lubricate main spraybar with oil. All-C-7806 Comment: Lubricate part of all boths and screws to be installed with the oil reservoir and oil burnp we have a spraybar with oil reservoir and oil burnp		petrolatum	•	W-P-236	-		6-16	4
Comment: Apply oil to threads of afferburner high-pressure filter head. VV-P-236 VV	Comment:	Lubricate preformed	packings for the affert	oumer high-pressure	filter with petrolo		}_	
Comment: Apply oil to threads of afferburner high-pressure filter head. VV-P-236 VV-P-236 VV-P-236		5		MIL-L-7808	L		6-16	17
Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Oil Milt-L-7808 Comment: Apply oil to threads of access plug for the afferburner fuel control filter. Oil Milt-L-7808 Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Oil Milt-L-7808 Comment: Lubricate threads or all coupling ruts for the afferburner pliot fuel manifold with oil. Oil Milt-L-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Milt-L-7808 Comment: Lubricate threads on afferburner pliot spraybar with oil. Oil Amilt-L-7808 Comment: Lubricate acmpound Milt-L-5544 Comment: Lubricate mainting studs on engine gearbox and oil boths and screws to be installed with the oil reservoir and oil pump waith petrol itum. Over-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump waith petrol itum.	Comment:	Apply oil to threads c	of afterburner high-pre	sure filter head.				
Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Oil Comment: Apply oil to threads of access plug for the afferburner fuel control filter. Oil Comment: Lubricate threads of all coupling nuts for the afferburner main fuel manifold with oil. Oil Mill-1-7808 Comment: Lubricate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. Oil Mill-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Mill-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Mill-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil All-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil All-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-1-7808 Comment: Lubricate threads on engine gearbox and oil bolts and screws to be installed with the oil reservoir and oil pump was petrol :tum VV-P-236 Comment: Lubricate ear: preformed backing to be installed with the oil reservoir and oil pump was petrol :tum VV-P-236 Comment: Lubricate ear: preformed backing to be installed with the oil reservoir and oil pump was petrol :tum VV-P-236 Comment: Lubricate ear: preformed backing to be installed with the oil reservoir and oil pump was petrol :tum		petrolatum	•	W-P-236			6-16	32
Comment: Apply oil to threads of access plug for the afterburner fuel control filter. Oil Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. MIL-L-7808 Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Oil Comment: Lubricate threads on afterburner main spraybar with oil. MIL-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. Oil Comment: Lubricate threads on afterburner pilot spraybar with oil. All-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound MIL-T-5544 Comment: Lubricate main study on engine gearbox and oil bolts and screws to be installed with the oil reservoir and oil pump warround it. Definal itum VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump warround it. T-6 Z2	Comment:	Lubricate new prefor	med packing for the c	ifferburner fuel confr	of filter with petro			
Comment: Apply oil to threads of access plug for the afferburner fuel control filter. oil Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Oil Mill-L-7808 Comment: Lubricate threads of all coupling ruts for the afferburner pilot fuel manifold with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7808 Comment: Lubricate mc.unting studs on engine gearbox and oil boits and screws to be installed with the oil reservoir and oil pump was petrol: turn Comment: Lubricate econopacking to be installed with the oil reservoir and oil pump was petrol: turn Comment: Lubricate econopacking to be installed with the oil reservoir and oil pump was petrol: turn Comment: Lubricate econopacking to be installed with the oil reservoir and oil pump with petrol: turn Comment: Lubricate econopacking to be installed with the oil reservoir and oil pump was petrol: turn		ō	•	MIL-L-7808	•		6 16	8
Comment: Lubricate threads of all coupling nuts for the afterburner main fuel manifold with oil. Oil Comment: Lubricate threads of all coupling nuts for the afterburner pilot fuel manifold with oil. Oil Mill-L-7808 Comment: Lubricate threads on afterburner main spraybar with oil. Oil Mill-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. All-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. Anill-L-7808 Comment: Lubricate main spraybar with oil. Anill-L-7808 Anill-L-7808 Comment: Lubricate main spraybar with oil. Anill-L-7808	Comment:	Apply oil to threads c	of access plug for the c	ifferburner fuel confi	ol filter.			
Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Oil Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Oil Comment: Lubricate threads on afterburner main spraybar with oil. Oil Comment: Lubricate threads on afterburner pilot spraybar with oil. AllL-1-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. AllL-1-5544 Comment: Lubricate mc.unting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump with petrol stum VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petrol stum VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petrol stum VV-P-236		75		MIL-L-7808		-	6-20	7
oil Comment: Lubricate threads of all coupling nuts for the afterburner pilot fuel manifold with oil. MilL-7808 Comment: Lubricate threads on afterburner main spraybar with oil. MilL-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound MilT-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump we petrol stum VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump we petrol stum To 22	Comment:	Lubricate threads of	all coupling nuts for the	e afferbumer main fu	uel manifold with			
Comment: Lubricate threads of all coupling nuts for the afterburner pilot fuel manifold with oil. MilL-7808 6-20.4 22		7	ſ •	MIL-L-7808			6-20	26
oil Comment: Lubricate threads on afterburner main spraybar with oil. Oil Milt-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound Milt-T-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump we petrol stum VV-P-236 Comment: Lubricate each preformed backling to be installed with the oil reservoir and oil pump with petrol stum VV-P-236 Comment: Lubricate each preformed backling to be installed with the oil reservoir and oil pump with petrol stum Lubricate each preformed backling to be installed with the oil reservoir and oil pump with petrol stum	Comment:	Lubricate threads of	all coupling nuts for the	e afferbumer pilot fu	el manifold with		-	
Comment: Lubricate threads on afterburner main spraybar with oil. Oil Comment: Lubricate threads on afterburner pilot spraybar with oil. Comment: Lubricate threads on afterburner pilot spraybar with oil. AllT-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump we petrol stum VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petrol stum T-6 Z2 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petrol stum		ē		MIL-L-7808			6-20A	8
oil Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound MilL-T-5544 Comment: Lubricate mcunting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump w petrol stum VV-P-236 Comment: Lubricate each preformed backling to be installed with the oil reservoir and oil pump with petrol stum Comment: Lubricate each preformed backling to be installed with the oil reservoir and oil pump with petrol stum	Comment:	Lubricate threads on	afferburner main spra	ybar with oil.		•		
Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound Anti-T-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump was petrol stum VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrol-film.		ē		MIL-L-7808		-	6-20A	37
antiseize compound NIL-T-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump w VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petrolature.	Comment:	Lubricate threads on	afferburner pilot spray	bar with oil.				
Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump we petrol stum VV-P-236 Comment: Lubricate each preformed backing to be installed with the oil reservoir and oil pump with petroloit in		antiseize com	punod	MIL-T-5544		•	7.	8
petrol :tum 7-6 22 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum	Comment:	Lubricate mounting s	ands on engine gearboard	ox and all bolts and s	screws to be insta	alled with the oil rese	ervoir and	v dund io
Docking to be installed with the oil reservoir and oil oump with petrolatum		petrol :tum		VV-P-236			4	
	Comment:	Lubricate each prefe	amed packing to be in	stalled with the oil re	of the form former	and with postcologies	\$	

Natication Natication	Current Practice is to use:	Other "Suitable Substitutes":	Type of Operation Inbrication	Crew Size	Quantity Time	Time	Indiv Risk
		• • • • • • • • • • • • • • • • • • • •	lubrication				
			lubrication				
			lubrication				
ith antiseize.			lubrication		_		
ith antiseize.			lubrication				
ith antiseize.			lubrication	. . . <u></u>			
			lubrication				···
			lubrication				
	and the state of t		lubrication				
			lubrication				
			lubrication				
			lubrication	\$a			
			lubrication	• •			
			lubrication	- •-			
	orteotro offi		lubrication				
			lubrication		··		

y Time Indiv Risk																
Quantity Time				<u> </u>			-,									
Crew Size			** -**													
Type of Operation tubrication	lubrication	lubrication	lubrication	lubrication	cleaning	lubrication	lubrication	servicing	cleaning	cleaning	lubrication	lubrication	tubrication fubrication	servicing	Bullion	
Other "Suitable Substitutes":	- 															
Current Practice is to use:																

•	9-5		1-8868 10-12 8		10-20 3, 24	10-12	10-12 32	one grease.	10-21 3	12-9 21		12-11 23		12-12		1-8868 12-12 28		13-7 36	•	13-12A 40	•	ģ.	13-13 22	ecirbox.	3-8045 13-13 24	_		13-14 7	13-14	13-14	13-14	13-14	13-14	13-14	13-14	13-14 13-14 13-14	13-14 13-14	13-14 13-14 13-14
Se FSN		e compound.	FSN 6505-684-8868	e main igniter plug and lead coupling nut with milk of magnesia.	一	FSN 8030-664-6146		Comment: Lubricate threads of four screws and two strap nuts with antiseize compound or graphite silicone grease.								FSN 6506-684-8868		-	c fluid.	-		Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	• •	Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox	FSN 9150-823-8045		2 full with grease.	2 full with grease.	2 full with grease. Ih red fluid.	2 full with grease. th red fluid.	2 full with grease. ih red fluid.	Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. hydraulic fluid! Before installing hydraulic pump on accessory gearbox, prime pump with red fluid. solvent Installing hydraulic pump. Blost-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air	2 full with grease. Ih red fluid. 1 at 25 psig with shop	2 full with grease. th red fluid. 1 at 25 psig with shop	2 full with grease. The red fluid. The table of the transport of the trans	2 full with grease. The red fluid. I at 25 psig with shop	2 fult with grease. The red fluid. If at 25 psig with shop and install gasket on gr	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. hydraulic fluid! MilL-H-5606 Comment: Before installing hydraulic pump on accessory gearbox, prime pump with red fluid. Solvent Comment: Installing hydraulic pump. Comment: Installing hydraulic pump. Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. antiseize compound MilL-T-5544 Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox.
e Reference		ibly with antiseiz		coupling nut with	nd ignition excite			antiseize compa		•	.sbr	P-236	-			-	milk of magnesic	,	filling pump case thru intake port with hydraulic fluid.		•	hent pressurized		of new gasket an	. —		ack of spline 1/2	ack of spline 1/2	il spline and fill relief cavity in back of spline 1/2 full with g MIL-H-5606 pump on accessory gearbox, prime pump with red fluid.	ack of spline 1/2 prime pump with	ack of spline 1/2 prime pump with	ack of spline 1/2 prime pump with 3 II IVent pressurized	ack of spline 1/2 prime pump with 11 Ivent pressurized	ack of spline 1/2 prime pump with 9 II Nent pressurized	ack of spline 1/2 prime pump with 3 II Ivent pressurized	ack of spline 1/2 prime pump with 3 II Ivent pressurized	ack of spline 1/2 prime pump with 3 II Nent pressurized of new gasket an	ack of spline 1/2 prime pump with III went pressurized of new gasket ar
	MIL-T-5544	ed valve assem	<u></u> -	ping and lead	er igniter plug ar	•	MIL-A-907	strap nuts with	MIL-L-23398	MIL-L-7808	tor mounting stu	FedSpecW-P-236	•				upling nuts with	MIL-H-5606	se thru intake p	P-D-680 Type II	•	f cavity using sol	MIL-T-5544	d to both sides o	6		relief cavity in to	relief cavity in b MIL-H-5606	relief cavity in b MIL-H-5606 essory gearbox,	relief cavity in bax MIL-H-5606 essory gearbox, pr P-D-680 Type II	relief cavity in b Milt-H-5606 essory gearbox, P-D-680 Type	relief cavity in b Milt-H-5606 essory gearbox, P-D-680 Type f cavity using so	relief cavity in b MIL-H-5606 essory gearbox, P-D-680 Type f cavity using sol MIL-T-5544	relief cavity in D MIL-H-5606 essory gearbox, P-D-680 Type f cavity using sol MIL-T-5544	relief cavity in D MilH-5606 essory gearbox, P-D-680 Type f cavity using sol MilT-5544	relief cavity in D MIL-H-5606 essory gearbox, P-D-680 Type f cavity using sol MIL-T-5544	relief cavity in D MIL-H-5606 essory gearbox, P-D-680 Type f cavity using sol MIL-T-5544	relief cavity in D MilH-5606 essory gearbox, P-D-680 Type f cavity using sol MilT-5544
Commercial Name	punodu	all screws on the ble	esia	engine main igniter	ne engine afferburne	Ease-Off 990	i one grease	four screws and two			tachometer genera		1 packings.	nkets and shrouds	ection.	esia	sses and hamess co	76			 	lines and spline relie	punodu	antiseize compound	Plostilube Moly No. 3	Hart Called In the Act	nemai spiine and iiii	niemai spiinė ana riii di	nemal spline and fill di raulic pump on acc	nemal spine and middle	inemal spine and fill of the control	nemal spine and middle relie with a spine and spline relie	riemal spiine and fiii di raulic pump on acc ump. ump.	nemal spine and nii di raulic pump on acci ump. Nines and spline relie	riemal spine and middle relies and spline relies and spline relies apound	riemal spine and fill a land fill a land fill a land fill a land spline relie apound	riemal spline and fill all all all all all all all all all	nemal spine and nii al raulic pump on acc ump. Alines and spline relie npound antiseize compounc
Known As	antiseize compound	Comment: Lubricate threads of all screws on the bleed valve assembly with antiseize compound.	magnesium oxide milk of magnesia	Comment: Lubricate threads of engin	Comment: This also applies to the engine afterburner igniter plug and ignition exciter.	antiseize com Ease-Off 990	graphite silicone grease	Lubricate threads of	dry lubricant	ō	Comment: Lubricate alternator-tachometer generator mounting studs.	petrolatum	Comment: Lubricate preformed packings.	insulation blankets	Comment: Engine afferburner section	Magnesium oxide Milk of magnesia	Comment: Lubricate diffuser bosses and hamess coupling nuts with milk of magnesia	hydraulic fluid	Comment: Prime hydraulic pump by	solvent	Comment:Installing AC generator.	Blast-flush internal sp	antiseize compound	Apply a thin coat of	grease	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease)	hydraulic fluid	hydraulic fluidi Comment: Before installing hydraulic	hydraulic fluik Before installing hydi solvent	hydraulic fluidi Comment: Before installing hydraulic solvent Comment: Installing hydraulic pump.	hydraulic fluik Before installing hydi solvent Installing hydraulic p Blast-flush internal sp	hydraulic fluik Before installing hydl solvent Installing hydraulic p Blæt-flush internal sp antiseize corr	hydraulic fluidi Before installing hydraulic pu solvent Installing hydraulic pump. Blast-flush internal splines an antiseize compound	hydraulic fluik Before installing hydi solvent Installing hydraulic p Blast-flush internal sp antiseize com	hydraulic fluik Before installing hydi solvent installing hydraulic p Blæt-flush internal sp antiseize corr	hydraulic fluik Before installing hydi solvent Installing hydraulic p Blast-flush internal sp antiseize corr	hydraulic fluik Before installing hydl solvent Installing hydraulic p Blast-flush internal sp antiseize corr
Chemical		Comment:	magnesium	Comment:	Comment:			Comment:			Comment:		Comment:		Comment:	Magnesium	Comment:		Comment:		Comment:Ir	Comment:		Comment:		Comment:			Comment:	Comment:	Comment:	Comment: Comment: Comment:	Comment: Comment: Comment:	Comment: Comment: Comment:	Comment: Comment:	Comment: Comment: Comment:	Comment: Comment: Comment:	Comment: Comment: Comment: Comment:

Indiv Risk														
Time													······································	
Quantify Time				•			****							
Crew Size														
Type of Operation lubrication	lubrication	lubrication lubrication lubrication	lubrication lubrication	lubrication	insulation	lubrication	dund euud	cleaning	lubrication	lubrication	dund euind	cleaning	lubrication	
Other 'Suitable Substitutes':														
Current Practice is to use:						-								

Sage 12

Chemical	Known As	Commercial Name	Military Name	Reference	FSN	Page	Line
	grease	Plostilube Moly No. 3			FSN 9150-823-8045	13-14	38
Comment:	Lubricate gearbox int	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease.	ef cavity in back of s	pline 1/2 full with	grease.		
	solvent	·	P-D-680 Type II			13.20	6
Comment:	Installing Northrop air	Comment: Installing Northrop airframe-mounted gearbox power shaft coupling	ox power shaff coup	oling.			
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pro	essurized at 25 p	sig with shop air.		
	grease	Plastilube Moly No. 3			FSN 9150-823-8045	13-20	3
Comment:	Lubricate gearbox int	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease.	ef cavity in back of s	pline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544			13-20	33
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	e compound to both sides of new gasket and install gasket on gearbox	lasket and install	gasket on gearbox.	•	
	solvent		P-D-680 Type II			13-21	42
Comment:	Installing Bendix airfro	Comment: Installing Bendix airframe-mounted gearbox power shaft coupg.	c power shaft coup.	Ď		•	
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pr	essurized at 25 p	sig with shop air.		
	grease	Plastilube Moly No. 3	•	•	3	13-22	2
Comment:	Lubricate gearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of s	pline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544			13-21	12
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	e compound to both faces of gasket; position gasket and power shaft coupling onto geard	et; position gask	et and power shaft o	coupling	onto geart
	solvent		P-D-680 Type II			13-23	25
Comment:	Installing Northrop en	Comment: Installing Northrop engine gearbox power shaft coupling.	haft coupling.				
Comment:	Blast flush internal spli	Comment: Blast flush internal splines and spline relief cavity using solvent pressurzed at 25 psig with shop air.	avity using solvent pri	essurized at 25 p	sig with shop air.	· •	
	grease	Plastilube Moly No. 3			3	13-23	8
Comment:	Lubricate gearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of s	pline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544			13-23	04
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	e compound to both faces of gasket; position gasket and power shaft coupling onto geard	et; position gask	et and power shaft o	coupling (onto geard
	solvent		P-D-680 Type II			13-25	8
Comment:	Installing Bendix engi	Comment: Installing Bendix engine gearbox power shaft coupling.	iff coupling.				
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pro	essurized at 25 p	sig with shop air.		
	grease		MIL-G-81322			13-26	٥
Comment:	Comment: Lubricate engine power sha	wer shaff coupling inte	iff coupling internal splines and engine gearbox axis B shaft gear (internal) splines with grease	ne gearbox axis	B shaft gear (interna	x) splines (x	with grease
	antiseize compound	punod	MIL-T-5544			13-26	13
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	e compound to both faces of gasket; position gasket and power shaft coupling onto gearb	et: position gask	et and power shaft o	coupling	onto geard
	solvent		P-D-680 Type II			13-28	17
Comment:	Replacing Northrop p	Comment: Replacing Northrop power shaft coupling quill shaft.	luill shaff.				
Comment:	Blast-flush internal spli	Blast-flush internal splines using solvent pressurized at 25 psig with shop air.	rurzed at 25 psig with	shop air.			
				•	-	_	

Current Practice is to use:	Other 'Suitable Substitutes':	Type of Operation lubrication	Crew Size	Quantity Time	Indiv Risk
		cleaning			
		lubrication			
		lubrication			
		cleaning			
		lubrication			
		lubrication			
72		cleaning			
		lubrication			
		lubrication			
<u>.</u>		cleaning			
		lubrication			
		lubrication			
Š		cleaning			-

Chamical	Known As	Commercial Name Military Name	Military Name	Reference	FSN	rage	rne
	grease	Plostilube Moly No. 3		· =	FSN 9150-823-8045	13-28	27
Comment: Lubric	ate coupling in	Comment: Lubricate coupling internal spline with grease. Inbricating oil	35e. Mil -L-7808	40		13-29	4
Comment: Fill gec zinc chromate	arbox with oil using ha	Comment: Fill gearbox with oil using hand oil can. Fill gearbox until oil runs out of filler tube. zinc chromate zinc chromate putty	gearbox until oil run MIL-P-8116	s out of filler tube		14-4	33
Comment: Apply a thin coat of zinc chizinc chromate zinc chromate putty	a thin coat of zinc chromate	Comment: Apply a thin coat of zinc chromate putty to mating surface of cockpit throttle quadrant assembly. Zinc chromate putty MIL-P-8116	o mating surface of MIL-P-8116	cockpit throttle	quadrant assembly.	14-6	8
Comment: Apply on history	a thin coat of	Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant.	o mating surfaces o	f engine bay cat	ole quadrant.	14-8	26
Comment: Lubric	ate cable hole oil	Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables.	en installing throttle	quadrant cables.		15-78	17
Comment: Oil lec	akage measure	Comment: Oil leakage measured in drops per minute.					

Page 15

Current Practice is to use:	Other 'Suitable Substitutes':	Type of Operation lubrication	Crew Size	Quantity Iime	Time	Indiv risk	
		servicing					
		ubrication					
		lubrication					
		lubrication					
	·-	troubleshooting					
	•						

F-5A Hazardov Developed by T.O. 1F-58-2-6 Basic:	F-5A Hazardous Materials Risk Analysis Developed by: Capt Janice M. Gavern I.O. 1F-5B-2-6 Powerplant Basic: Through Change Number:	Current as of: 30 April 1993	ril 1993			·
Chemical	Known As Commercial Name hydraulic fluid	Military Name MIL-H-83282 or MIL-H-5606	Reference	FSN	Poge 1-53	Line 12
Comment: M Comment: Pe	Comment: Maintenance personnel use a hydraulic tes Comment: Personnel may be exposed to spillage. petrolatum	a hydraulic test stand to provide external hydraulic power tto operate the various aircraft sy o spillage. VV-P-236	ternal hydraulic	power tto operate t	the various	aircraft sy 26
Comment: A	Comment: Apply to preformed packings. Iubricating oil	MIL-L-7808	1.0. 4282-1-1		2-5	7
Comment: Lt	Comment: Lubricate packing grooves, lead-in chamters, bores, and or Comment: Page 2-4A and 2-5 contain a chart listing engine lubricants. preservative		e diameters over 1.0, 21-185-66-1	which preformed p	3-103	ust pass.
Comment: Er	ine has been preserved uid	before removal of a MIL-F-7024	uick engine char	nge components.	3-114	13
Comment: If	Comment: If fuel flowmeter is to be stored, ensure that flowmeter is filled with calibration fluid to protect internal parts. spray lube Lubri-Bond 3-102	flowmeter is filled wit	th calibration fluid	3 to protect internal parts FSN 9150-754-0064 3-102	3-102	8
Comment: L	Comment: Lubriciate trunnion mount balls with Lubri-Bond spray lube. cleaning compound MIL-C-18687	and spray lube. MIL-C-18687			3-102	8
Comment: C	graphite grease Comment: Coat internal mating surfaces of the throttle control quick-disconnect rod with a thin film of graphite grease	MIL-G-21164 control quick-discor	nect rod with a	thin film of graphite	3-138 grease.	=
Comment: L	spray lube Lubri-Bond A MIL-L-23398 Comment: Lubricate preformed packing groove and inner surface of right half (of slip-joint coupler) with Lubrii-Cond A. solid film lubricant MIL-L-46147	MIL-L-23398 nner surface of right MIL-L-46147	half (of slip-joint o	coupler) with Lubrit	3-139 Cond A. 3-139	14 14
Comment:	Comment: Ubricating oil Milt-L-78 Cont oil affectuirer attach both with lubricating oil	80	T.O. 4282-1-1		3-146	80
Comment: Be	comment: Before installing manifold, coat attach bott threads with Jet-Lube SS-30 (Hi-Temp) VV-P-236	p) threads with Jet-Lube VV-P-236	sS-30 (Hi-Temp)	8030-00-180-6315	3-149 3-151 3-157	228
Comment: LL	Comment: Lubricate preformed packing (on ruel flown	ig (on tuel flowmeter fransmitter) with petrolatum.	n petrolatum.			

Current Practice is to use: stems.	Non-hazardous alternative	Type of Operation maintenance	Crew Size	Quantity	Time	Indiv Risk
		lubrication				
		lubrication				
		lubrication				
		lubrication				
		lubrication				
		lubrication				- -
		lubrication lubrication lubrication				

readed control cables with oil. Commercial Name Military Name Reference 55N 9150-05-543-7220 3-162 peed control cables with oil. Fig. 0. 2J-1-13 3-179 and each of any occurred and any of resolute and any of any occurred and a		petrolatum VV-F	W-P-236			3-159	8
FSN Page 9150-00-543-7220 3-162 3-179 3-179 3-179 5-179 5-179 5-179 5-179 5-179 5-179 5-179 5-179 5-182 5-18	Comment:	Lubricate seals (on fuel inlet manifold mounting	stuck) with petro	latum.			
9150-00-543-7220 3-162 3-179 FSN 9150-964-9228 3-179 FSN 9150-964-9244 3-182 4-182 4-5 FSN 8030-664-6146 4-45 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 A graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Chemical	Commercial Name		Reference		Page	Line
3-179 FSN 9150-964-9228 (3-179 FSN 9150-964-9244 FSN 9150-964-9244 FSN 9150-964-9244 FSN 8030-664-6146 FSN 8030-664-6146 FSN 8030-664-6146 FSN 9150-735-1800 FSN 9150-735-1800 FSN 9150-823-0845			1-25681			3-162	4
3-179 FSN 9150-964-9228 3-179 FSN 9150-964-9244 FSN 9150-964-9244 FSN 9150-964-9244 FSN 9150-964-9244 FSN 8030-664-6146 FSN 9150-735-1800 FSN 9150-735-1800 FSN 9150-823-0845	Comment:	Lubricate remote speed control cables with oil.					
3-179 FSN 9150-964-9228 3-179 FSN 9150-964-9244 3-182 Iup of residue. 3-182 Iemperature seciont. 3-182 Iemperature seciont. 3-182 Institution 3-182 Instit		vapor degrease	. 	i.o. 2J-1-13		3-179	•
3-179 FSN 9150-964-9228 3-179 FSN 9150-964-9244 3-182 tup of residue. 3-182 -182 -182 -182 -182 -182 -182 -182	Comment:	Vapor degrease parts in accordance with Proc	ess 1, T.O. 2J-1-13	ĸ			
FSN 9150-964-9228 (3-179) FSN 9150-964-9244 3-182 4up of residue. 3-182 -182 -182 -182 -182 -182 -182 -182		acetone O-A	1-51			3-179	24
FSN 9150-964-9228 3-179 FSN 9150-964-9244 3-182 IMP of residue. 3-182 Imperature seciont. 3-182 Institution 3-182 In	Comment:	Rinse parts in clean reagent grade acetone, an	nd air dry.				
FSN 9150-964-9244 3-182 4-182 4-5 4-5 FSN 8030-664-6146 7-5 FSN 9150-735-1800 7-6 7-6 7-6 7-6 7-6 7-7 7-7 7-7 7-7 7-7		solid film lubricant			FSN 9150-964-9228	3-179	&
3-182 tup of residue. 3-182 -182 -182 -182 -182 -182 -182 -182	Comment:			•	FSN 9150-964-9244		
3-182 -temperature sectorit. 3-182 3-182 3-182 3-182 3-182 ust-Lick. 4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 FSN 9150-823-0845 5-6 FSN 9150-823-0845 5-6A Boxe. 5-6A Ize compound. 5-8			. -	I.O. 1F-5A-3		3-182	4
3-182 -temperature seciont. 3-182 -182 -182 -182 -182 -182 -182 -182	Comment:	The engine bay firewalls must be cleaned at pre	escribed intervals	to prevent build	Jup of residue.		
1-182 3-182 3-182 3-182 3-182 3-182 3-182 4-5 5-6 5-6 5-6 25 psig with shop air. 5-6 5-6 5-6 25 psig with shop air. 5-6 6-735-1800 5-6 7-735-1800 7-735-18		high-temperature sealant		I.O. 1F-5A-3		3-182	7
3-182 3-182 ust-Lick. 4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 X graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 6-6 5-6 FSN 9150-823-0845 6-6 5-6 FSN 9150-823-0845 6-6 5-6 5-6 5-6 5-6 5-6 5-6 5-6 5-6 5-	Comment:	If any firewall access panels are removed the pa	anels must be res	sealed with high	-temperature sealan	<u>ني</u> ه	
3-182 ust-Lick. 4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 Ar graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8		Rust-Lick No. 606		1.0. 21-3185-102	•	3-182	10
3-182 ust-Lick. 4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 x graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Comment:	Clean the engine compressor section using reve	erse Rust-Lick and	1 water-wash.			
List-Lick. 4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 T graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8		corrosion prev WD-40	=	1.0. 2J-J85-102		3-182	23
4-5 FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 X graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Comment:	Use only WD-40 or Rust-Lick No. 606 to preserve (engine. Do not r	nix WD-40 and R	ust-Lick.		
FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 Ar graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8		insulation blanket			-	4-5	21
FSN 8030-664-6146 4-45 FSN 9150-735-1800 4-45 x graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Comment:	This is the compressor casing insulation blanket.		•			
FSN 9150-735-1800 4-45 x graphite silicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8		antiseize complete Off 990				4-45	9
x graphite stilicone grease. 5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-6			-A-907			4-45	7
5-6 25 psig with shop air. FSN 9150-823-0845 5-6A Base. 5-6A ize compound. 5-8	Comment:	Lubricate threads on flexible drive shaft coupling	g nuts with antise	ize compound o	or graphite silicone a	recse.	
5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8		**	-F-7808	•		2	-
5-6 25 psig with shop air. FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Comme.it:	All line fittings on fuel control should be lubricate	ed with oil.				
25 psig with shop air. FSN 9150-823-0845 5-6A Base. 5-6A ize compound. 5-8		solvent P-D-	-680 Type II			2	&
FSN 9150-823-0845 5-6A ease. 5-6A ize compound. 5-8	Comment:	Clean gearbox axis D shaffgear internal splines v	with P-D-680 Type	e II pressurized a	125 psig with shop of		
sase. 5-6A ize compound. 5-8		grease Plasti-tube Moly No.3	-		FSN 9150-823-0845	₹	5
5-6A ize compound. 5-8	Comment:	Lubricate pump splined shaft and gearbox axis	D internal spline	sparingly with gr			
ze compound.		antiseize compound MIL-	1-5544	,		5-6A	7
8	Comment:	Lubricate threads of the four studs on engine ge	earbox mounting	pod with antise	ize compound.		
		antiseize compound MIL-	.T-5544			8	2
	Comment:	Lubricate threads of fuel inlet manifold mounting	g studs with antis	eize compound			
VV-P-236		petrolatum VV-F	P-236			84	12

		lubrication				
Current Practice is to use:	Non-hazardous alternative	Type of Operation lubrication	Crew Size	Quantity Time	Time	Indiv Risk
		cleaning				
		cleaning				
		lubrication				
		cleaning				
		resecting		· · · · · · · · · · · · · · · · · · ·		
		cleaning				
		preserving		4 025		
	······································	maintenance				
	<u>.</u>	lubrication lubrication				
		lubrication				
		cleaning				
		lubrication				
		lubrication				
		lubrication				
		lubrication				

Page 4

Comment: Lubricate fuel inlet manifold seals with petrolatum.			
petrolatum VV-P-236	5.8	8	*
Comment: Lightly lubricate the three preformed packings (on the main fuel pump) with petrolatum.	Matum.		
Chemical Known As Commercial Name Military Name Reference F	FSN Pag	9	Line
thel pump) with			,
petrolatum	<u>.</u>	5-8A 13	~
essure relief valve cover) with petrolatum befa			
antiseize com Ease-Off 990	FSN 8030-664-6146 5-11		_
graphite stilcone grease MIL-A-907	<u>ጥ</u>		323
Comment: Lubricate threads on the four bolts (on the main fuel nozzel) with antiseize compound or graphite silicone	und or graphite silico	gred	•
petrolatum VV-P-236	<u> </u>	5-12 33	·
Comment: Lubricate preformed packing (main fuel control filter) with petrolatum.			
oil MIL-L-7808	ሴ	5-12 35	<u>.</u>
Comment: Apply oil to threads of access plug (main fuel control filter).			•••
petrolatum VV-P-236	<u></u>	5-14 10	_
Comment: Lubricate new preformed packing (main fuell lpump filter) with petrolatum.			
oil MIL-L-7808	<u>φ</u>	5-14 12	~
Comment: Apply oil to threads of cap and spring assemble on the main fuel pump filter.		-	
solvent P-D-680 Type II	<u></u>	5-17 18	•
Comment: Using solvent P-D-680 pressurized at 25 psi with shop air, blast-flush internal splines on the overspeed governor.	on the overspeed go	vernor.	
grease Plastilube Moly No. 3	FSN 9150-823-8045 5-	5-17 29	•
Comment: Lubricate mating splines on governor and gearbox with grease.			
degreasing solvent	ι b	5-19 26	•
Comment: This procedure uses an ultrasonic cleaning unit. If one is not available, clean filter elements in accordance with T.O. 2J-1	elements in accordo	ance with]	1.0.21-1
Comment: Clean filter parts except preformed packings and filter element by washing in degreasing solvent.	reasing solvent.		
Comment: This procedure also applies to the oil filter parts.			
carbon remover compound MIL-C-25107	<u> </u>	5-19 28	~
Comment: Soak filter element for 30 minutes in carbon remover compound before placing element in ultrasonic cleaning unit.	ement in ultrasonic c	Jeaning u	÷.
Comment: This procedure also applies to the oil filter element.	7	7-13 25	5
cleaning fluid	υ	5-19 33	8
P-C-436	<u>φ</u>	5-19 33	3
Comment: This procedure applies to the main fuel control filter and to the main fuel pump filter.	er.		

		lubrication				
Current Practice is to use:	Non-hazardous allemalive	Type of Operation Jubrication	Crew Size	Quantity	Time	Indiv Risk
		lubrication				
		lubrication lubrication				
		lubrication				
		lubrication				
		lubrication				
		lubrication				
		cleaning				
		lubricate				
<u>r</u>		cleaning				
<u> </u>						
		cleaning				··-
		cleaning cleaning cleaning				

comment: #	A			•	
	Comment: It also applies to the oil titter element.	_		/-I3	87
	solvent P-D-680 Type II		-		18
Comment: U	Comment: Use P-D-680, pressurized at 25 psig, to blast-flush internall splines on the afferbumer fuel control and pump assembly	s on the afferbu	mer fuel control and	pump ass	embly.
	Oil MIL-L-7808			<u>\$</u>	32
Comment: A	Comment: All line fittings on the fuel control should be jubricated with oil		····		
Chemical	Known As Commercial Name Military Name	Reference	FSN	Page	Line
	grease Plastilube Moly No. 3		FSN 9150-823-8045 6-11	6.1	35
comment: L	Comment: Lubricate afferbumer fuel pump splined shaft and gearbox axis E shaftgear internal apline with grease	kis E shaftgear int	emal apline with grec	92	
	petrolatum VV-P-236		-	6.11	૪
Comment: La	Comment: Lubricate preformed packing seal on afterburner fuel control and pump assembly with petrolatum.	and pump asser	nbly with petrolatum.		
	antiseize compound MIL-T-5544			Ø-13	•
Comment: Le	Comment: Lubricate threads of fuel inlet manifold mounting studs with antiseize compound	ntiseize compour	Ġ.		
	petrolatum VV-P-236			6-13	æ
Comment: La	Comment: Lubricate fuel inlet manifold seals with petrolatum.		• • ·		
	petrolatum VV-P-236	•		6-13	8
Comment: L	Comment: Lubricate preformed packings on afferburner fuel pump with petrolatum.	petrolatum.			
	antiseize compound MIL-F-5544			6-13	ଞ
Comment: L	Comment: Lubricate stucts for the afferburner fuel pump with antiseize compound.	empound.	-		<u>.</u>
	petrolatum VV-P-236			6-15	8
Comment: L	Comment: Lubricate preformed packings for the afterbuner high-pressure filter with petrolatum.	re filter with petro	olatum.		.
	Oil MIL-L-7808			6-15	52
Comment: A	Comment: Apply oil to threads of afterburner high-pressure filter head.	····			
	petrolatum VV-P-236			6-17	4
comment: L	Comment: Lubricate new preformed packing for the afterburner fuel control filter with petrolatum.	ntrol filter with pe	trolatum.		
	Oil MIL-L-7808			417	. •
Comment: A	Comment: Apply oil to threads of access plug for the afterburner fuel control filter.	ntrol filter.	-		
	Oil MIL-L-7808		•	6-20	
comment: L	Comment: Lubricate threads of all coupling nuts for the afterbumer main fuel manifold with oil.	fuel manifold wi	ttoet.		
	Oil MIL-L-7808			6-21	လ
λomment: μ	Comment: Lubricate threads of all coupling nuts for the afterbumer pilot fuel manifold with oil.	fuel manifold wit	hoil.	. -	
	oil MIL-L-7808			6-21	፠
comment: La	Comment: Lubricate threads on afferburner main spraybar with oil.				
	Oil MiL-L-7808			6-22	8

		cleaning		•		
		lubrication				
Current Practice is to use:	Non-hazardous altemative	Type of Operation lubrication	Crew Size	Quantify Time	Time	Indiv Risk
	•	lubrication				
		lubrication			-	
	-	lubrication				
		lubrication				
		lubrication				
		lubrication				
		lubrication				
	****	lubrication				
		lubrication				
		lubrication		···········		
		lubrication		·		
		lubrication				
		lubrication		·• • • ·		

Page 8

	7-5	8
Comment. Labracia moduling state of engine gearbox and an bara chews to be instance with the office and of pump v		22
Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum. Amil: 1-5544	th petrolatum. 7-5	જ
oil pump with	7-5	37
Comment: Lubricate spline of oil pump and mating spline in engine gearbox with oil. Chemical Rown As Commercial Name Military Name Reference FSN	Poge	Line
antiseize compound Apply antiseize compound to line connections on top of oil res	7.6	80
Oil Oil MIL-L-7808	7-6A	15
Comment: Before attaching oil cooler lines, lubricate connecting fittings with oil.		<u>.</u>
petrolatum VV-P-236	7-6A	6
Comment: Lubricate new preformed packings for the oil cooler installation with petrolatum. Itichloroethane	7-8A	ಣ
Comment: Clean all parts in trichloroethane.		
Comment:Lubricate new preformed packing for the oil filter with petrolatum.	<u> </u>	<u> </u>
petrolatum VV-P-236	7-9	25
ed packing for the oil pre		
VV-P-236 Comment: Lubricate preformed packing and install on reducer fitting		
Comment: Engine serica # 27,3559 and later engines modified by T.O. 2J-J-85-675.	·	
To.	7-11	17-20 & 34
Comment: New warning note: Lube oil may contain tricresyl phosphate. This additive is poisonous and can be readily absorbed the Comment: Ensure oil does not remain on skin. Oil may bein it exposed to hard or flower.	and can be readily	absorbed th
degreasing solvent O-T-620 or equivalent	7-13	8
Comment: Clean oil filter parts, except preformed pacckings and filter element, by washing in degreasing solvent.	reasing solvent.	
solvent P-D-680 Type II	8-4	24
Comment: Use P-D-080 pressurized at 25 psig with shop air to blast-flush internal splines on the variable exhaust nozzle power unit. Oil 8-4A 5	ole exhaust nozzle p 8-4A	ower unit.

		lubrication				
nith antiseize.		lubrication				
		lubrication				
		lubrication				
Current Practice is to use:	Non-hazardous alternative	Type of Operation lubrication	Crew Size	Quantity	Time	Indiv Risk
		lubrication				
		lubrication				
		cleaning				
		lubrication				
		lubrication				
		servicing				
ough the skin.						
		cleaning				
		cleaning				
		lubrication				

of studs for the variable exhaust nozzle power unit.		
grease Plasfliube Moly No. 3 FSN 9150-823-8045	8-4A	.0.
Comment: Lubricate the mating splines of the exhaust nozde power unit and engine gearbox sparingly with grease.	Ose.	
antiseize compound FSN 8030-664-6146	8-5	37
graphite silicone grease MIL-A-907	8-5	8
Comment: Coat threads of variable exhaust nozzle actuator attach bolts with antiseize compound or graphite silicone grease	silicone gr	ease.
Oil MIL-L-7808	8-13	18
Comment: Service the variable exhaust nozzle power unit with oil until oil level is even with lower surface of oil check port	heck port.	
Chemical Known As Commercial Name Military Name Reference FSN	Page	Line
ate. This additive is poisonous and can be	readily at	sorbed th
_		
Comment: Neoprene gloves and face shield/safety goggles will be worn.		
	9-5	15
Comment: Apply a small amount of sealing compound onto compressor casing bleed valve mounting flange.		
	9-5	17
Comment: Lubricate threads of all screws on the bleed valve assembly with antiseize compound.		
505-684-8868	10-11	15
Comment: Lubricate threads of engine main igniter plug and lead coupling nut with milk of magnesia.		
	10-12	6&27
FSN 8030-664-6146	10-11	8
graphite silicone grease MIL-A-907	10-11	37
Comment: Lubricate threads of four screws and two strap ruts with antiseize compound or graphite silicone grease.	gse.	
dry lubricant MIL-L-23398	10-21	01
Oil MIL-L-7808	12-9	17
Comment: Lubricate alternator-tachometer generator mounting studs.		
Comment: Spray valve butterfly and valve internal surface with dry lubricant.		
petrolatum FedSpecVV-P-236	12-11	23
Comment: Lubricate preformed packings.		
insulation blankets and shrouds	12-12	16834
Comment: Engine afferburner section.		
Magnesium oxide Milk or magnesia	12-12	26
Comment: Lubricate diffuser bosses and hamess coupling nuts with milk of magnesia.		
	13-7	35
		3

		lubrication				
		lubrication				
	!	servicing				
Current Practice is to use: ough the skin.	Non-hazardous alternative	Type of Operation	Crew Size	Quantity	Time	Indiv Risk
		sealing				
		lubrication				
		lubrication				
		lubrication lubrication lubrication				
		lubrication				:
		lubrication				
		insulation				
		lubrication				
		prime pump				

Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox: Comment: Aboly a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox: Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN 13-12 28	teep away from 13. hop air. 13. 13. 13. 14. 15. 16. 16. 17. 18. 18. 18. 18. 18. 18. 18	from sparks or 13-11 21 4 13-12 6 13-12 13-12 13-13 11 13-13 11	5 and flam 21 6 6 11
Comment: Prime hydraulic pump by filling pump case thru intake port with hydraulic fluid. solvent Comment:Installing AC generator. Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. antiseize compound Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbogeacase Plastilube Moly No. 3 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MIL-H-5606	13. 13. 20. gearbox. 2-823-8045 13.	-12 -12 -13 -13 -13 -13 -14 -15 -15 -15 -15 -15 -15 -15 -15 -15 -15	
Solvent Comment:Installing AC generator. Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox grease Plastilube Moly No. 3 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MIII-H-5606			
Comment:Installing AC generator. Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. Antiseize compound Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox grease FSN 9150-823-8045 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MII-H-5606			
Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air. antiseize compound Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox grease Plastilube Moly No. 3 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MIII-H-5606			
Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox grease Plastilube Moly No. 3 FSN 9150-823-8045 FSN 9150-823-8045 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MIL-H-5606			~ ~ e
grease Plastilube Moly No. 3 Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN MIL-H-5606	•		e
Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease. Chemical Known As Commercial Name Military Name Reference FSN NII-H-5606	Po		9 ~ -
Known As Commercial Name Military Name Reference hydraulic fluid	<u>8</u> ;	The destruction of the second	
	Ş		~ -
	<u> </u>		
g hydraulic pump on access			
solvent P-D-680 Type II			
Comment: Installing hydraulic pump.		**	
Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	hop air.	~=	
antiseize compound MIL-T-5544	13	13-13	~!
Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox	on gearbox.		
grease Plastilube Moly No. 3 FSN 9150-823-8045		13-13 24	-
Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease.			
solvent P-D-680 Type II	13	13-19 37	_
Comment: Installing Northrop airframe-mounted gearbox power shaft coupling.			. "-"
Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	hop air.		
grease Plastilube Moly No. 3 FSN 9150-823-8045	3-823-8045	13-20	_
Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease.			
antiseize compound MIL-1-5544	13	13-20	~
Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox	on gearbox.		
solvent P-D-680 Type II	13	13-21 25	
Comment: Installing Benaix airframe-mounted gearbox power shaft coupling.	-•		
Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	hop air.		
grease Plastilube Moly No. 3 FSN 9150-823-8045 13-21)-823-8045 13-	-21 37	_
Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease.			
ontisel:e compound MIL-T-5544	13-21	-21 39	

Ś		cleaning				
		lubrication				
		lubrication				
Current Practice is to use:	Non-hazardous allemative	Type of Operation prime pump	Crew Size	Quantity	Time	Indiv Risk
		cleaning				
		lubrication				
		lubrication				
		cleaning				- N
		lubrication				
		lubrication				
		cleaning		- Andrew College		
		lubrication		approximate of the		
		lubrication				

Page 14

Comment:	Apply a this	n coat of	Comment: Apply a thin coat of antiseize compound to both faces of gasket: position gasket and power shaft coupling onto gearb	both faces of gaske	t: position gaske	et and power shaft c	conbling o	nto geard
	solvent	ent		P-D-680 Type II) }		13-22A	12
Comment:	Installing N	orthrop er	Comment: Installing Northrop engine gearbox power shaft coupling.	haft coupling.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1		
Comment:	Mast-flush inter	nternal sp. ase	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurzed at 25 psig with shop all. grease Plastilube Moly No. 3 FSN 9150-823-80	aviry using solvent pr	ed cz ip pezinsse	री	13-23	
Comment:	Lubricate g	yearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of s	pline 1/2 full with	grease.		
	anti	antiseize compound	punodi	MIL-T-5544			13-23	13
Comment:	Apply a this	in coat of	Comment: Apply a thin coat of antiseize compound to both faces of gasket; position gasket and power shaft coupling onto gearb	both faces of gask	at; position gaske	et and power shaft c	coupling c	nto gearb
	solvent	ent		P-D-680 Type II			13-26	2
Comment:	Installing Be	endix eng	Comment: Installing Bendix engine gearbox power shaft coupling.	iff coupling.				
Comment:	Blast-flush ir	nternal sp	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurted at 25 psig with shop air.	avity using solvent pre	ssurized at 25 ps	ig with shop air.		
	grease	ase 3		MIL-G-81322			13-26	24
Comment:	Lubricate e	od euigue	Comment: Lubricate engine power shaft coupling internal splines and engine gearbox axis B shaft gear (internal) splines with grease	mal splines and engi	ne gearbox axis	B shaft gear (interna	v seulids (k	/ith grease
Chemical	Kno	Known As	Commercial Name	Military Name	Reference	FSN	Page	Line
	a a	antiseize compound					13-26	28
Comment:	Apply a thi	in coat of	Comment: Apply a thin coat of antiseize compound to both faces of gasket; position gasket and power shaft coupling	both faces of gask	at; position gask	et and power shaft c		onto gearb
	solvent	ent		P-D-680 Type II	•			24
Comment: Replacing Northrop power s	Replacing	Northrop	power shaft coupling quill shaft.	quill shaft.				
Comment:	Blast-flush in	nternal sp	Blast-flush internal splines using solvent pressurized at 25 psig with shop air.	surized at 25 psig with	shop air.			
	grease	ase	Plastilube Moly No. 3			FSN 9150-823-8045	13-27	8
Comment:	Lubricate c	i guildno:	Comment: Lubricate coupling internal spline with grease					
 -	<u>d</u>	lubricating oil		MIL-L-7808			13-28	23
Comment:	Fill gearbox	x with oil c	Fill gearbox with oil using hand oil can. Fill gearbox until oil runs out of filler tube.	gearbox until oil runs	out of filler tube.			
Comment:		ng note:	New warning note: Lube oil may contain tricresyl phosphate. This additive is poisonous and can be readily absorbed th	rcresyl phosphate. I	his additive is po	isonous and can be	readily at	sorbed th
Comment:	Ensure oil o	does not re	Comment: Ensure oil does not remain on skin. Oil may burn if exposed to heat or flames.	bum if exposed to h	eat or flames.			
Comment:	Neoprene	gloves an	Comment: Neoprene gloves and face shield/safety goggles will be worn.	aggles will be worn.				
zinc chromate		zinc chromate putty	e britty	MIL-P-8116		-	14-4	8
Comment: Apply a thin coat of zinc chr	Apply a thi	in coat of	zinc chromate putty to	omate putty to mating surface of cockpit throttle quadrant assembly	ockpit throttle qu	addrant assembly.		
zinc chromate	ate zinc	zinc chromate putty	e putty	MIL-P-8116			14-7	0
Comment:	Apply a thi	in coat of	Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant.	mating surfaces of	engine bay cabl	e quadrant.		
No lubricant listed	t listed.						14-9	28
Comment:	Lubricate c	cable hole	Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables.	n installing throttle qu	adrant cables.			
	ō				•			
Comment:	Oil leakage	e medisure	Comment: Oil leakage measured in drops per minute.					

.x		cleaning				
		lubrication		. , .		
		lubrication				
Š.		cleaning				
		lubrication				
Current Practice is to use:	Non-hazardous alternative	Type of Operation Lubrication	Crew Size	Quantity	Time	Indiv Risk
.xo		cleaning				
		lubrication				
		servicing				
rough the skin.						
		lubrication		, .		
		ubrication		. ,		
,,		lubrication				
		troubleshooting				

Appendix B

Technical Order Automation

The following technical orders have been reviewed, and could be automated to facilitate review for identification of hazardous materials.

1F-5A-2-4	Pneudraulic Systems
1F-5A-2-5	Fuel Systems
1F-5A-2-7	Electrical Systems
1F-5A-2-8	Landing Gear Systems
1F-5A-2-10	Radio, Communication and Navigation Systems
1F-5A-2-11	Armament
1F-5A-17	Storage of Weapon Systems
1F-5A-33-1-1	Non Nuclear Munitions Basic Information
1F-5A-33-1-2	Non Nuclear Munitions Loading Procedures
XX1F-5A-2-2	Ground Handling, Storage, and Airframe Maintenance
XX1F-5A-2-3	Flight Control Systems
XX1F-5A-2-6	Powerplant
XX1F-5A-2-9	Instruments
XX1F-5A-3	Structural Repair
XX1F-5A-23	Corrosion Control
XX1F-5A-36	Non-Destructive Inspection
1F-5B-2-3	Flight Control Systems
1F-5B-2-4	Pneudraulic Systems
1F-5B-2-5	Fuel Systems
1F-5B-2-10	Radio, Communication and Navigation Systems
1F-5B-2-11	Armament
CSTO XX1F-5B-2-6	Powerplant
CSTO XX1F-5B-2-7	Electrical Systems
CSTO XX1F-5B-2-8	Landing Gear Systems
NOVIE ED 2.2	County Handling Stones and Airforns Maintenance
XX1F-5B-2-2	Ground Handling, Storage, and Airframe Maintenance
XX1F-5B-2-6	Powerplant
XX1F-5B-2-9	Instruments
NTM1F-5B-2-2(1)	Ground Handling, Storage, and Airframe Maintenance
NTM1F-5B-2-6(1)	Powerplant

NTM1F-5B-2-7(1)	Electrical Systems
NTM1F-5B-2-9(1)	Instruments
NTM1F-5B-2-10(1)	Radio, Communication, and Navigation Systems
NTM1F-5B-2-11(1)	Armament
NTM1F-5B-2-2(2)	Ground Handling, Storage, and Airframe Maintenance
NTM1F-5B-2-3(2)	Flight Control Systems
NTM1F-5B-2-4(2)	Pneudraulic Systems
NTM1F-5B-2-5(2)	Fuel Control Systems
NTM1F-5B-2-6(2)	Powerplant
NTM1F-5B-2-7(2)	Electrical Systems
NTM1F-5B-2-8(2)	Landing Gear Systems
NTM1F-5B-2-9(2)	Instruments
NTM1F-5B-2-10(2)	Radio, Communication, and Navigation Systems
NTM1F-5B-2-11(2)	Armament
Organizational Manuals	
1F-5E-2-1-1	Airplane General
1F-5E-2-1-3	Cross Servicing Guide
1F-5E-2-12-1	Support Information, Part I
1F-5E-2-12-2	Support Information, Part II
1F-5E-2-2-3-2	Flight Control, Rudder System
1F-5E-2-20-5	Powerplant
1F-5E-3	Structural Repair
1F-5E/F-5F-23	Corrosion Control
1F-5E-33-1-1	Non Nuclear Munitions Basic Information
1F-5E-33-1-2	Non Nuclear Munitions Loading Procedures
	(Now SR1F-5E-33-1-2)
1F-5E-36	Non Destructive Maintenance
1F-5E-39	Aircraft Battle Damage Repair
Supplementary Technical	Manuals
1F-5E(III)-2-1-1	Airplane General
1F-5E(III)-2-12	Support Information
1F-5E(III)-23	Corrosion Control
1F-5E(III)-33-1-1	Non Nuclear Munitions Basic Information
1F-5E(III)-33-1-2	Non Nuclear Munitions Loading Procedures
1F-5F-2-1-1	Airplane General
1F-5F-2-12-1	Support Information, Part I
1F-5F-2-12-2	Support Information, Part II

Appendix C

- The Environmental Protection Agency List of 17 Toxics

 1. Benzene
 2. Chromium
 3. Lead
 - 4. Methyl Ethyl Keytone
 - 5. Methylene Chloride
 - 6. Perchloroethylene
 - 7. Cyanides
 - 8. Toluene
 - 9. Trichloroethane
 - 10. Xylene
 - 11. Cadium
 - 12. Carbon Tetrachloride
 - 13. Chloroform
 - 14. Mercury
 - 15. Methyl Isobutyl Keytone
 - 16. Nickel
 - 17. Trichloroethylene

Appendix B: F-5 Technical Order Data Base for Hazardous Materials

F-5A Hazardous Materials Risk Analysis Developed by: Capt Janice M. Gavern I.O. 1F-5A-2-1 General Airplane Basic: 1 Aug 70 through Change 14: 15	rierials Risk Analysi pt Janice M. Gave General Airplane ough Change 14:	s fn 15 Aug 87	Current as of: December 1992	mber 1992		
Chemical	wn As aulic fluid aulic fluid	Commercial Name	ime 12	Reference T.O. 1F-5A-2-2 T.O. 1F-5A-2-2	FSN XXXX-XXX-XXXX	Poge 1-46 1-46
Tuel Comment: Internal fuel is contained Comment: A 50 gallon tank can be engine oil		JP-4 in five internal bladder used at each wingtip;	MIL-T-5624 -type fuel cells in the a 150 gallon droppa MIL-L-7808	1.0. 1F-5A-2-5 fuseslage cente tale tank can be 1.0. 1F-5A-2-8 1.0. 1F-5A-2-6	I.O. IF-5A-2-5 In five internal bladder-type fuel cells in the fuseslage center section. Total usable fuel capac used at each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each wingtip; a 150 gallon droppable tank can be attached to left and right wing standard each each each each each each each each	2-2A fuel capac ght wing ste 2-4 5-1
nickel-cadmium nitrogen	liquid oxygen aircraft battery rain repellent		MIL-O-27210 Type II T.O. 1F-5A-2-2 & 1.O. 1F-5A-2-4 T.O. 8D2-3-1 T.O. 1F-5A-2-2 & 1.O. 1F-5	1.0. 1F-5A-2-2 & 1.0. 1F-5A-2-4		2-2A 4-9 2-4 2-5
Comment: (a solutalinament) (a s	tion of a proprietar lubricants (fuselage) (skins) (high-temp areas) (high-temp areas)	y repellent formulation	supplied in throwar	vay-type aerosol 1.0. 1F-5A-2-2 1.0. 1F-5A-2-2 1.0. 1F-5A-2-2 1.0. 1F-5A-2-2 1.0. 1F-5A-2-2	Comment: (a solution of a proprietary repellent formulation supplied in throwaway-type aerosol containers pressurized with nitrog [Lubricants] (fuselage) (fuselage) (aluminum alloy (skins) (high-temp areas)	4-10 with nitrog 2-5 3-1 3-1 3-1
LAST ENTRY		4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		***************************************

<i>Line</i> 30	Current Practice is to use:	Other 'Suitable Substitutes':	Type of Operation Servicina	Crew Size	Quantity 201.25 US acts	Time	Indiv Risk
30 legend ify = 583 g	30 legend ity = 583 gallons.		servicing		2@1,25 US gals 583 gals		
4 6 31	is, or a rad gallon dropped a	· · · · · · · · · · · · · · · · · · ·	servicing		2 @ 4qts ea (3.7 to 5.6 qts)		
legend 16 37			servicing		5 lifers		
3 8 8			servicing				
en gas) 26 3			servicing				,
ည							
							÷

F-5A Hazardous Materials Risk Analysis Developed by: Capt Janice M. Gavern I.O. 1F-5A-2-2 Basic: 1 Aug 70 through Change 33: 15	als Risk Analysis anice M. Gavern Ground Handling, Servicing, and Airframe Maintenance h Change 33: 15 May 89	icing, and Airframe M	Current as of: December 1992 aintenance	ember 1992		
Chemical	Known As hydraulic fluid	Commercial Name	Military Name MIL-H-83282 MIL-H-5606	Reference	FSN	<i>Page</i> 1-46 1-46
Comment: Insure support equipment hydraulic fluid		used to service/perform maintenance has the same type of fluid as that in the aircraft. 2-63	tenance has the sa	me type of fluid	as that in the aircr	off. 2-63
Comment: Clean landing gear shock kerosene		struts and pistons with a clean cloth soaked with hydraulic fluid.	cloth soaked with	hydraulic fluid.		2 4 5 8 5 8 6 8 7
Comment: Use kerosene as a solvent ethylene glycol- anti-icing and propylene glycol		to remove dirt and grit on landing gear shock struts and pistons.	ding gear shock str	uts and pistons.		4 4 5 c
Comment: Anti-icing and delicing fluid is used to prevent the accumulation of frozen deposits on surfaces of aircraft while on the gi	ind deicing fluid is used	fo prevent the accur	nulation of frozen a	 eposits on surfa	ces of aircraft while	on the gr
Comment: Fluid may flash at temperatures above 200 degrees F. Comment: Fluid is mildly toxic and personnel should avoid contact Comment: Fluid may be diluted with equal parts by volumn of was	Fluid may flash at temperatures above 200 degrees F. Fluid is mildly toxic and personnel should avoid contact with skin or eyes. Ruid may be dijuted with equal parts by volumn of water and heated to	atures above 200 degrees F. Irsonnel should avoid contact with skin or eyes. equal parts by volumn of water and heated to a temperature of 80 to 100 degrees F.	with skin or eyes. or and heated to a	temperature of	80 to 100 degrees	u :
Comment: Do not use fluid full strength. It will damage painted surfaces. Comment: Heated fluid should be applied at pressures as high as possible but not over 100 to 125 psi on metal surfaces.	fluid full strength. It will dishould be applied at	damage painted surfi pressures as high as p	aces. ossible but not ove	100 to 125 psi c	on metal surfaces.	
isopropyl alcohol				•		2-65
Comment: A mixture of equal parts of isopropypl alcohol and water should be used afternately with MIL-A-8243A defrosting fluid. MIL-E-26243 Type FEU 1M FSN 4210-203-5361 2-68	f equal parts of isoprop fire extinguisher	typi alcohol and wafe	r should be used of MIL-E-26243 Type FEU 1M	tenately with M	IIL-A-8243A defrosti FSN 4210-203-5361	ing fluid. 2-68
Comment: Vaporizing liquid fire extinguisher. JP-4 fuel		Used to provide standby fire protection. NATO F-40	lby fire protection. MIL-T-5624			3-3
Comment: Left fuel system. JP-4	tem. JP-4	NATO F-40	MIL-T-5624			3-3
Comment: Right fuel system.		NATO F-40	MIL-T-5624			3-3
Comment: Centerline pylon tank.	pylo n tank .			•		

Line Current Practice is to use: Other "Suitable Substitutes": 31	Type of Operation	Crew Size	Quantity	Time	Indiv Risk
33 29	cleaning				
8 % S	cleaning				
27 bund or to remove accumulated deposits.	anff-Icing delcing				
34	deicing				
	fire extinguisher				
	servicing		293 US gals		
9	servicing		305 US gals		
	servicing		152 US gats		

Comment: Two wing pyton tanks Comment: Wild H83282 to synthetic system: left reservoir. Comment: MiL-H83282 to synthetic system: left and right gearboxes. Intervention by droutic system: left and right gearboxes. Intervention by the left and right gear shock struts are furnished with preservative oil when service drain to check that supply for water and other contaminants. Intervention by a preservative oil and right and right gear shock struts. Intervention by the right gear shock struts are furnished with preservative oil when service drain to refer and year or clean dry air to inflate shock struts. Intervention by a prince of the right gear struts in condaminate the companion of the right gear struck struts are furnished by the right gear of the right gear struck struts. Intervention of the right gear of the right graph system tanks in capean capean the condaminate traces. Intervention of the right gear of the ri	Chemical	Known As	Commercial Name	Military Name	Reference	FSN	Page
Comment: Two wing pylon tanks Comment: Two wing pylon tanks Comment: Two wing pylon tanks Comment: Will-H83282 is a synthetic hydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy inydraulac system; left reservoir. Comment: Mill-H83282 is a synthetic hydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy inydraulac system; left reservoir. Comment: Mill-H83282 is a synthetic hydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy in a synthetic hydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy in a synthetic pydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy in a synthetic pydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy in a synthetic pydrocarbor base bydraufa find with an oxidation inhibitor, and an antiwear agent diacesy in a synthetic pydrocarbor base bydraufa find of inspections in a service of a synthetic pydrocarbor base bydraufa find in a synthetic pydrocarbor base bydraufa find in a synthetic pydrocarbor base bydraufa find in a service drain to check tuel supply for wrater and other contaminants. A conditioning unit; turbine of synthetic pydrocarbor base driving gear shuts in accordance with 10. 15X-1-1.10. 42Bc-1-1. and 10. Comment: A quantity of residual fuel is drainer element. Proceedure to clean fuel strainer element. Procedure to clean fuel strainer element. Proc		JP-4	NATO F-40	MIL-T-5624			3-3
Comment: Two wings fanks Comment: Will-H83282 to synthetic hydrocaulic fluid with an oxidation inhibitor, and an antiwear agent (titaresy interest) Comment: Mill-H83282 to synthetic hydrocaulic fluid with an oxidation inhibitor, and an antiwear agent (titaresy interest) Comment: Mill-H83282 to synthetic hydrocaulic fluid with an oxidation inhibitor, and an antiwear agent (titaresy interest) Comment: Mill-H83282 to synthetic hydrocaulic system; delt reservoir. MATO D-148 MATO D-148 MILL-7808 Comment: Engine oil: left and right engine-mounted oil reservoirs. Inquid oxygen Comment: Breathcole oxygen Comment: Air conditioning unit; turbine oil sump plug holes. Comment: Right or festivation the legal oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. 451-182 Comment: Right or festivation the legal oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. 451-182 Comment: Right or festivation the legal oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. 451-182 Comment: Right or festivation the service data in to check fluid supply for water and other contaminants. Procedure to clean the strained with preservative oil one of data in preservative oil when service data introgen Any introder and other contaminants Any introder and other or over any art to infarte shock struits Any introder and introgen or clean day art to infarte shocks the shock struits Any introgen Any introder any approved history syste	Comment:	Two wing pylon tanks		1 6 4 0 4			6
Comment: Not wingsplicitly fluid cultications and the services of comment: Mil-H83282 Comment: Mil-H83282 Comment: Mil-H83282 Comment: Mil-H83282 Comment: Fight control hydroulic system; left reservoir. Comment: Fight control hydroulic system; left reservoir. Comment: Fight control hydroulic system; left and right reservoir. Comment: Accessory drive gearbox; left and right engine-mounted oil reservoirs. Comment: Engine oil; left and right engine-mounted oil reservoirs. Comment: Breathable oxygen. Comment: Prico to refueld the left of the left		10-4 		MIL-1-3024			2
Comment: Utility hydroulic system; eff reservoir. Comment: MIL-H83282 is a synthetic hydrocarbon base hydroulic fuld with an oxidation inhibitor, and an antiwear agent (thcresy lingardule system; eff reservoir. MIL-H83282 is a synthetic hydrocarbon base hydroulic fuld with an oxidation inhibitor, and an antiwear agent (thcresy lingardule system; eight searvoir.) Comment: Mil-H83282 is a synthetic hydrocarbon base hydroulic fuld with an oxidation inhibitor, and an antiwear agent (thcresy lingardule system; eight searvoir.) MIL-C-7808 Comment: Mil-H83282 is a synthetic hydrocarbon base hydroulic fuld with an oxidation inhibitor, and an antiwear agent (thcresy lingardule system). Comment: Accessory drive gearbox; left and right gearboxs. MIL-C-27210 MIL-C-2	Comment:	Iwo wingtip tanks		00000			
Comment: MiL-H83282 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwer agent (intressy) Comment: MiL-H83282 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwer agent (intressy) Comment: MiL-H83282 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwer agent (intressy) Comment: MiL-H83282 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwer agent (intressy) Comment: MiL-H83282 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwer agent (intressy) Comment: Accessory drive gearbox; left and right gearboxes. MIL-C27210 MIL-C27210 MIL-C27210 MIL-C27210 MIL-C27210 MIL-C27210 MIL-C282-1-1 MIL-C27210 MIL-C282-1-1 MIL-C27210 MIL-C27210 MIL-C27210 MIL-C282-1-1 MIL-C27210 MIL-C282-1-1 MIL-C282-1-1 MIL-C282-1-1 MIL-C282-1-1 MIL-C282-1-1 MIL-C382-1-1			AICH-SV	MIL-H-83282			٠- ١
Comment: MilL-H83292 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwear agent (titatesy) Comment: All-H83292 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwear agent (titatesy) Comment: All-H83292 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwear agent (titatesy) Comment: All-H83292 is a synthetic hydrocarbon base hydraulic fluid with an oxidation inhibitor, and an antiwear agent (titatesy) Comment: Accessory drive gearbox; left and right eaglacoxis. INATO D-148 INATO D-148 INIL-L7808 I.O. 4282-1-1 I.O. 4282-1-1 Ination of the antipolar and an antiwear agent (titatesy) Ination of the accessory drive gearbox; left and right eaglacoxis. Ination of the accessory and a synthetic fluid oxygen Comment: Breathable oxygen Ination of finite and an inhibitor and an antiwear agent fluid oxygen Ination of finite and an inhibitor and an antiwear agent fluid oxygen Comment: All conditioning unit: turbine of sump. Comment: Replacement for the strained from the service admit to check fuel supply for water and other confaminarities of the proceedure to clean fuel strainer element. Incl. 45-1-182 Incl. 45-1-1	Comment:	Utility hydraulic system; left reserve	<u></u>				3-50
Comment: Right control hydraulic field NATO H-537 MIL-H-83282 (Comment: MIL-H-83282) a synthetic hydrocarbon bose hydraulic fluid with an oxidation inhibitor, and an antitwear agent research. Comment: Accessory drive gearbox: left and right gearboxes. Oil NATO O-148 MIL-L-7808 (T.O. 4282-1-1) 3-5.5 Comment: Engine oil: left and right engine-mounted oil reservoils. MIL-C-27210 Type ii (flquid) Comment: Breathable oxygen. Comment: Recathable oxygen. Comment: Ar conditioning unit: turbine oil sump. Comment: All unit oil runs out of both sump plug holes. Comment: All unit oil runs out of both sump plug holes. Comment: Ar conditioning unit: turbine oil sump. Comment: Replacement and other contraminants. P-D-680 Comment: Replacement and other contraminants. All-H-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Comment: Be only approved nitragen or clean dry air to infate shock struts. All-L-6083 Comment: Use only retruiturocethylene tape for oxygen system tapered pipe threads. 3-37 Comment: Use only betriafluoroethylene tapes for oxygen system tapered pipe threads.	Comment:	MIL-H-83282 is a synthetic hydroca	arbon base hydraulic fl	uid with an oxidati	ion inhibitor, and	an antiwear agen	t (tricresy)
Comment: Flight control hydroulic system; right reservoir. Comment: MIL-H-83222 is a synthetic hydrocatic base hydroulic miles by the comment of the specific miles by the comment of the specific miles by the comment of the comment of the comment. Accessory drive georabox; left and right engine-mounted oil reservoirs. Comment: Engine oil: left and right engine-mounted oil reservoirs. Comment: Breathcable oxygen. Comment: Breathcable oxygen. Comment: Pit until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: A quantity of residual fuels actained from the service drain to check fuel supply for water and other contaminants. Comment: Replacement coloring gear shock struts are furnished with preservative oil. Dub-680 Comment: Replacement coloring gear shock struts are furnished with preservative oil. Dub-680 Comment: Replacement coloring gear shock struts are furnished with preservative oil. Dub-680 Comment: Replacement coloring gear shock struts are furnished with preservative oil. Do not drain preservative oil when servative oil without servative oil which reservative oil when servative oil when servative oil what servative oil when servative oil when servative oil when servative oil strained by retrained procedure for oxygen system traped preach preach. All-1-1-27730 Sala 2-2-1-182 Comment: Replacement coloring gear shock struts are furnished with preservative oil. Do not drain preservative oil when servative oil salary system traped preach preached by the produced by the franchal preached by the produced		hydraulic fluid	NATO H-537	MIL-H-83282			3-3
Comment: MilL-H83282 is a synthetic hydrocarbon base hydraulic field with an oxidation inhibitor, and an antiwear agent (tricresy) Comment: Engine oil: India oxygen Comment: Breathable oxygen Comment: Breathable oxygen Comment: Prizonal india in the liquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 4282-1-1 All-C-27210 Type II (liquid) Type II (li	Comment:	Flight control hydraulic system; rig	ht reservoir.				3-29
Oil	Comment:	MIL-H-83282 is a synthetic hydroco	arbon base hydraulic fl	uid with an oxidati	ion inhibitor, and	dan antiwear agent	t (tricresyl
Comment: Accessory drive gearbox; left and right gearboxes. Induicosory drive gearbox; left and right gearbox; left and right gearbox; left and right engine-mounted oil reservoirs. Induicosory gen. Induicosory gen.		lo lio	NATO O-148	MIL-L-7808	1.0. 4282-1-1		3-3
Comment: Engine oil; left and right engine-mounted oil reservoirs. Iquid oxygen IQuid oxygen IQuid IQ	Comment:	Accessory drive gearbox; left and	I right gearboxes.				3-53
Comment: Engine oil; left and right engine-mounted oil reservoirs. Comment: Breathable oxygen. Comment: Breathable oxygen. Comment: Personnel required to fill or drain the liquid oxygen system must become familiar with I.O. 15X-1-1, I.O. 4286-1-1, and I.O. 400 a		io		MIL-L-7808	T.O. 4282-1-1		3-3
Comment: Engine oil; left and right engine-mounted oil reservoirs. Iquid oxygen Iquid oxyge					1.0.00-25-172		3-26A
Iquid oxygen Iquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. Comment: Prior to refueling unit; turbine oil sump. Comment: Fill until oil runs out of both sump plug holes. Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with T.O. 45-1-182 3-12 Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with T.O. 45-1-182 3-25 Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Comment: Procedure to clean fuel strainer element. Prosevorative oil MIII-H-6083 3-32 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing straffucorethylene tape for oxygen system tapered pipe threads. All -1-27330 3-37	Comment:	Engine oil; left and right engine-m	ounted oil reservoirs.				-
Comment: Breathable oxygen. Comment: Personnel required to fill or drain the liquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 42Bo-1-1, and T.O. 100 million to drain the liquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 42Bo-1-1, and T.O. 100 million truns out of both sump plug holes. Comment: Air conditioning unit; turbine oil sump. Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with T.O. 45-1-182 million to restruct the strainer element. Solvent Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing intragen dry nitragen and ordinate shock struts. MIII-N-6011 3-32 Comment: Use only approved nitragen or clean dry air to inflate shock struts. MIII-N-6011 3-37 MIII-12730 3-37 MIII-12730		liquid oxygen		MIL-O-27210			
Comment: Breathable oxygen. Comment: Personnel required to fill or drain the liquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. 101 Solid Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Replacement leading gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing shift of holes. Comment: Use only approved nitragen or clean dry dir to inflate shock struts. Mill-1-27730 Comment: Use only tetrafluoroethylene tage for oxygen system tagered pipe threads.				Type II (liquid)			3-3
Comment: Personnel required to fill or drain the liquid oxygen system must become familiar with T.O. 15X-1-1, T.O. 4286-1-1, and T.O. 15X-1-1, T.O. 4281-1-182 Comment: Air conditioning unit; turbine oil sump. Comment: Pli uniti oil runs out of both sump plug holes. Comment: Pli uniti oil runs out of both sump plug holes. Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struits in accordance with T.O. 45-1-182 Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Procedure to clean fuel strainer element. Procedure to clean fuel fuel fuel fuel fuel fuel fuel fuel	Comment:	Breathable oxygen.					
Comment: Air conditioning unit; turbine oil sump. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with T.O. 45-1-182 Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Solvent Comment: Procedure to clean fuel strainer element. Procedure to clean fuel strainer element. Procedure to clean fuel strainer element. AmilH-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing shock struts. Any nitrogen Any nitrogen Any nitrogen or clean dry air to inflate shock struts. MIII-1-27730 Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	Personnel required to fill or drain t	he liquid oxygen systen	n must become fo	miliar with T.O. 1	5X-1-1, T.O. 4286-1-1	1, and 1.0
Comment: Air conditioning unit; turbine oil sump. Comment: Fill until oil runs out of both sump plug holes. Comment: Fill until oil runs out of both sump plug holes. To 4S-1-182 Comment: A quantity of residual fuel is circled from the service drain to check fuel supply for water and other contaminants. Solvent Comment: Procedure to clean fuel strainer element. All-H-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing intragen. Any nitrogen. Any nitrogen or clean dry air to inflate shock struts. Petrafluoroethylene tape. Any nitrogen or clean dry air to inflate shock struts. All-1-27730 Comment: Use only petrafluoroethylene tape for oxygen system tapered pipe threads.		TO .		MIL-L-6085A			3-3
Comment: Fill until oil runs out of both sump plug holes. Comment: Prior to refueling the directif, clean the exposed chrome portion of landing gear struts in accordance with T.O. 45-1-182 Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Solvent Comment: Procedure to clean fuel strainer element. Preservative oil Anti-H-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing shock struts. Anti-N-6011 3-34 Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	Air conditioning unit; turbine oil su	ď				3-54
Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with 1.O. 45-1-182 Luel/water		Fill until oil runs out of both sump p	olug holes.				
Comment: Prior to refueling the aircraft, clean the exposed chrome portion of landing gear struts in accordance with 1.O. 4S-1-182 (Lalfwater solvent solvent preservative oil preservative oil preservative oil and printingen and printingen and prior to inflate shock struts. Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing strated and prior to inflate shock struts. Comment: Use only approved nitragen or clean dry air to inflate shock struts. Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.					1.0. 45-1-182		3-12
fuel/water Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Solvent Comment: Procedure to clean fuel strainer element. p-D-680 Comment: Procedure to clean fuel strainer element. preservative oil MIL-H-6083 Comment: Replacement landing gear shock struts are fumished with preservative oil. Do not drain preservative oil when servicing solutions only nitrogen Comment: Use only approved nitrogen or clean dry air to inflate shock struts. tetrafluoroethylene tape Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	Prior to refueling the aircraft, clea	n the exposed chrome	portion of landing	g gear struts in a	ccordance with I.O	45-1-182
Comment: A quantity of residual fuel is drained from the service drain to check fuel supply for water and other contaminants. Solvent solvent comment: Comment: Procedure to clean fuel strainer element. Procedure to clean fuel strainer element. Procedure to clean fuel strainer element. MIL-H-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing shiftingen or clean dry air to inflate shock struts. MIL-N-6011 Amil-N-6011 S-34 Comment: Use only approved nitrogen or clean dry air to inflate shock struts. Procedure to read other tope for oxygen system tapered pipe threads.		fuel/water					3-25
Solvent solvent brocedure to clean fuel strainer element. Comment: Procedure to clean fuel strainer element. P-D-680 MilH-6083 Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing sometry of process of the servicing struts. Comment: Use only approved nitrogen or clean dry air to inflate shock struts. MilH-6083 3-34 Comment: Use only approved nitrogen or clean dry air to inflate shock struts. Tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	A quantity of residual fuel is drain	ed from the service dro	win to check fuel su	upply for water c	and other contamin	ants.
Comment: Procedure to clean fuel strainer element. preservative oil Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing sometimates only nitrogen dry nitrogen AllI-N-6011 Comment: Use only approved nitrogen or clean dry air to inflate shock struts. MIL-T-27730 3-37 Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.		solvent		P-D-680			3-26
preservative oil Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing solutions and replacement landing gear shock struts and replacement of the configuration of clean dry air to inflate shock struts. MIL-T-27730 3-37 Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	Procedure to clean fuel strainer e	lement.				
Comment: Replacement landing gear shock struts are furnished with preservative oil. Do not drain preservative oil when servicing snitrogen dry nitrogen dry nitrogen dry dir to inflate shock struts. tetrafluoroethylene tape Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.		preservative oil		MIL-H-6083		Ξ	3-32
nitrogen dry nitrogen 3-34 Comment: Use only approved nitrogen or clean dry air to inflate shock struts. tetrafluoroethylene tape Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	Comment:	Replacement landing gear shock	struts are furnished wit	h preservative oil.	Do not drain pri	eservative of when	servicing s
30 Threads.	nitrogen	dry nitrogen		MIL-N-6011			3-34
30 threads.	Comment:	Use only approved nitrogen or cle	san dry air to inflate sh	ock struts.			
Comment: Use only tetrafluoroethylene tape for oxygen system tapered pipe threads.	tetrafluoroe	thylene tape		MIL-T-27730			3-37
	Comment:	Use only tetrafluoroethylene tape	for oxygen system tap	ered pipe threads	<u></u>		

Line 13	Current Practice is to use:	Other "Suitable Substitutes":	Operation servicing	Crew Size	Quantity To	Time	Indiv Risk
15			servicing		2009 US gals		
71 %	·		servicing		1.25 US gals		
2. phosphate	~~ (6						
26			servicing	• No. 1	1.25 US gals		
phosphate	- (
23			servicing		2 @44 ounces		
188			servicing		2@1 US gal		
3							
27			servicing		5 ifters		
00-25-172	····oi						
2 2			servicing				
8			cleaning				
13			draining fuel	*			·
£ 3			cleaning				
12 hate			preserving				
2		~~~~~	servicing	. ,			
43			servicing				

Chemical Known As Commercial Name Military Name	Reference	FSN	Page
nickel-cadmium ni-cad battery	T.O. 1F-5A-2-7		3-51
Comment: The battery is a 19-cell 24-volt 11-ampere-hour nickel-cadmium battery.			
	-		3-53
Comment: Clean gearbox drainplug by washing in solvent. Use clean dry air at 29 psi or less to remove solvent.	or less to remov	e solvent.	
petrolatum VV-P-236	_		3-57
Comment: Lubricate water separator preformed packing and reinstall on outer periphery of screen disk.	ery of screen di	₹	
Freon 113 and rain repellent fluid			3-59
silicone-titanate copolymer			
Comment: Removal of rain repellent fluid container.			
Comment: Once the retaining torque on the container has been broken, the container must be unscrewed as rapidly as possible to	r must be unscr	ewed as rapidly as	possible to
Comment: Avoid contact of rain repellent fluid with skin or prolonged breathing of vapors	ors.		
Freon 113 solvent or repellent			3-60
Comment: Placie removed rain removal system nozdes in Freon 113 and allow to sock until buildup has dissolved.	until buildup ha	s dissolved.	
Mirror Glaze Machine	•		
Light Cleaner PN MGM-2			3-61/3-62
Comment: Use this product to remove rain repellent fluid residue from aircraft windshield.	Ġ.		
cleaning compound			3-61/3-62
Comment: Use this product if the Mirror Glaze Machine Light Cleaner is not available.			
grease MIL-G-81322			4-1
Comment: Be sure new wheel cones and rollers are packed with grease before installation.	tion.		4-26
Comment: Do not use different types of grease in the same wheek: this grease is not compatible with petroleum base lubricants	ompatible with	petroleum base lu	ibricants.
methyl ethyl	•		5-20A
ketone (mek)	-		
Comment: MEK is discribed but not required for anything on this page.			
alum oxide grit			5-20A
Comment: Remove all baked on dry film lubricant from new botts with dry grit blast with 120 grit alum oxide.	120 grit alum	oxide.	
solid film lubricant Mil-S-22473,			5-20A
grade N or T, form R	~		
Comment: Apply cleaner primer to 15% spar attach bott.			
type III loctife MIL-R-46082		-	5-20A
Comment: Apply loctite to 15% spar attach boit.			5-23
type Il loctite MIL-T-46082			7-3
Comment: Apply loctite to grounding receptacle hex nut.			

Line 19		Current Practice is to use:	Other "Suitable Substitutes":	Operation servicing	Crew Size	Quantity	Time	Indiv Risk
<u> </u>				cleaning				-
0	e Minery and Language to			lubrication				
•				servicing				
Dre	vente	prevent excessive fluid spillage.						
<u>.</u>				cleaning				
				cleaning				
<u>2</u>	• • •			cleaning				
36 10.14,16	4,16			lubrication				
4	** ***							
27				cleaning				: : '
ষ্				lubrication				
35 18 24	en e mere			maintenance	-			
	•							······································

allphathia inaphthia indepth and be used as a cleaner for acryfic wholehield panes. It should not be contused with aromatic reduction and personal processors in the processor of the processor o
58-3. 58-3. 17. aphtha. 34
-3 5A-3. aphtha. 34.
3. 5A-3. Aphtha. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3.
tive. T.O. 1F-5A-3 Ith T.O. 1F-5A-3. Ism with naphtha. d lock crank. T.O. 1F-5A-3 Ith Kem Weld.
five. T.O. 1F-5A-3 Ith T.O. 1F-5A-3. Ism with naphtha. d lock crank. T.O. 1F-5A-3 Ith Kem Weld. f Loctife to threads.
T.O. 1F-5A-3 Ith T.O. 1F-5A-3. Ism with naphtha. d lock crank. T.O. 1F-5A-3 Ith Kem Weld.
ith T.O. 1F-5A-3. Ism with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
usm with naphtha. d lock crank. T.O. 1F-5A-3 th Kern Weld.
ism with naphtha. d lock crank. T.O. 1F-5A-3 th Kern Weld.
usm with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
usm with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
usm with naphtha. d lock crank. T.O. 1F-5A-3 th Kern Weld.
ism with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
ism with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
usm with naphtha. d lock crank. T.O. 1F-5A-3 th Kem Weld.
cleaner cleaner cleaner by sealant to canopy jettison thruster threads. cleaner cleaner cleaner cleaner cleaner cleaner cleaner epoxy Epon 815 adhesive T-1 curing agent ply mixture of adhesive and curing agent to mating surfaces of shaft and lock crank. Putty Kem-Weld putty Resin D25-8 T.O. 1F-5A-3 Kem-Weld hardener D21-9 store between the switch actuator arm and the crank must be filled with Kem Weld. Sealant Loctite Grade H (1-1) nused electrical connector adapters are loose, apply a small amount of Loctite to threads.
cleaner epoxy epoxy Epon 815 adhesive epoxy T-1 curing agent ply mixture of adhesive and curing agent to mating surfaces of shaft and lock crank. putty Kem-Weld putty Resin D25-8 T.O. 1F-5A-3 Kem-Weld hardener social curing agent to mating surfaces of shaft and lock crank. Resin D25-8 T.O. 1F-5A-3 Kem-Weld hardener Stot in lock housing below shim with Kem-Weld putty. Loctite Grade H (1-1) nused electrical connector adapters are loose, apply a small amount of Loctite to threads.
epoxy Epon 815 adhesive Epon 815 adhesive T-1 curing agent ply mixture of adhesive and curing agent to mating surfaces of shaft and lock crank. putty Kem-Weld putty Resin D25-8 I.O. 1F-5A-3 Kem-Weld putty. Sediant Loctite Grade H (1-1) Incompted
epoxy T-1 curing agent T-2 caph. T-2 caph. T-3 caph. T-3 caph. T-4 caph. T-5 caph. T-5 caph. T-6 caph. T-7 caph.
T-1 curing agent to mating surfaces of shart and lock crank. putty Resin D2S-8 T.O. 1F-5A-3 Kem-Weld putty Resin D2S-8 I.O. 1F-5A-3 Kem-Weld hardener Stot in lock housing below shim with Kem-Weld putty. area between the switch actuator arm and the crank must be filled with Kem Weld. Loctite Grade H (1-1) section to threads.
ply mixture of adhesive and curing agent to matting surfaces of shart and lock crank. putty Kem-Weld putty Resin D25-8 I.O. 1F-5A-3 Kem-Weld putty Soft in lock housing below shim with Kem-Weld putty. area between the switch actuator arm and the crank must be filled with Kem Weld. Sediant Loctite Grade H (1-1) nused electrical connector adapters are loose, apply a small amount of Loctite to threads.
putty Kem-Weld putty Resin D2S-8 1.0. 1F-5A-3 Kem-Weld hardener Sol in lock housing below shim with Kem-Weld putty. sadant Loctite Grade H (1-1) nused electrical connector adapters are loose, apply a small amount of Loctite to threads.
slot in lock housing below shim with Kem-Weld purity. a area between the switch actuator arm and the crank must be filled with Kem Weld. section to connector adapters are loose, apply a small amount of Loctife to threads.
Comment: Fill slot in lock housing below shim with Kem-Weld putty. Comment: The area between the switch actuator arm and the crank must be filled with Kem Weld. sealant Loctite Grade H (1-1) Comment: If unused electrical connector adapters are loose, apply a small amount of Loctite to threads.
Comment: The area between the switch actuator arm and the crank must be filled with Kem Weld. Sealant Loctite Grade H (1-1) Comment: If unused electrical connector adapters are loose, apply a small amount of Loctite to threads.
Section to the Grade H (1-1) Comment: If unused electrical connector adapters are loose, apply a small amount of Loctite to threads.
Comment: If unused electrical connector adapters are loose, apply a small amount of Loctite to threads.
Comment: If unused electrical connector adapters are loose, apply a small amount of Loctite to threads.
Comment: Paint handgrip retention slot with zinc chromate after filing.

15 15	Current Practice is to use:	Other 'Suitable Substitutes':	Operation cleaning	Crøw Size	Quantity	Time	Indiv Risk
12			maintenance				
4 4			maintenance				
ಜ			maintenance				
18			painting				
24			cleaning				
\$ 104			sealing				
			cleaning			·····•	
21			secting		100 parts 20 parts		
24			guing		45 parts 55 parts		
\$ ≏	• ••••		Secting			F*************************************	
38			painting				

F-5A Hazardous Materials Risk Analysis Developed by: Capt Janice M. Gavern T.O. 1F-5A-2-4 Pneudraulic Systems Basic: 1 Aug 70 through Change 19: 15 June 85	erials Risk Analysis of Janice M. Gavern Pneudraulic Systems ugh Change 19: 15.	s June 85	Current as of: December 1992	cember 1992			
Chemical	Known As hydraulic fluid	Commercial Name	Military Name MIL-H-83282	Reference	FSN	Page 2-1	Line 14
Comment: This hyd	raulic fluid is a synthoil	Comment: This hydraulic fluid is a synthetic hydrocarbon base fluid with an ocidation inhibitor, and an antiwear agent (fricresyl phosphation) oil 2-3 5 5	e fluid with an oci MIL-L-7808 or MII -H-5606	dation inhibitor, c	and an antiwear ager	of (fricresy) 2-3	phosphat 5
Comment: Lubrical	e mating surfaces o	Comment: Lubricate mating surfaces on hoses and tubes with light oil. VV-P-236	h light oil.			2-3 2-3	11 77
Comment: Lubricate preformed packing, are petrolatum, technical Comment: Light, semisolid material compositions	e preformed packing, petrolatum, technical misolid material comp	Lubricate preformed packing, and bulkhead fitting end with pe petrolatum, technical UV-P-236 Light, semisolid material composed of petroleum waxws and oil.	nd bulkhead fitting end with petrolatum. VV-P-236 ed of petroleum waxws and oil.	atum.			37
Comment: Melting point: 117 to 140 degrees F. Comment: May be used in small quantities for antiseize compound, white lead base	point: 117 to 140 degrused in small quantifit antiseize compound, white lead base	Metting point: 117 to 140 degrees F. May be used in small quantities for electrical or hydraulic connections. cantiseize compound, white lead base	rdraulic connectic JAN-A-669			2-10	2
Comment: General purpose antiseize and seating composition. Thick paste composed of white lead (60%), grice comment: Contact with air causes moderate hardening.	I purpose antiseize or ste composed of with air causes mo	Comment: General purpose antiselze and sealing compound for threaded parts. Comment: Thick paste composed of white lead (60%), graphite (10%), petrolatum (10%), mineral oil (10%), and asphalt (10%). Comment: Contact with air causes moderate hardening.	d for threaded pa ite (10%), petrolat	rts. rum (10%), minerc	il oil (10%), and aspho	alt (10%).	
Comment: Used for all types of tetrafluoroethylene Teffon tape	all types of threads Teffon tape	Comment: Used for all types of threaded connections for pressures up to 150 psl and for temperatures up to 350 degrees F. tetrafluoroethylene Teflon tape 2-10 2-21	ssures up to 150 p MIL-T-27730	sal and for tempe	ratures up to 350 deg	_	13 5 12
Comment: Pure Teffon ribbon tape suitable Comment: May be used for thread sealant Comment: Teffon tape is the only sealant ar antiseize compound, graphite-petrolatum Comment: Heavy paste composed of 50% Comment: Suitable as an antiseize compound	Pure Teffon ribbon tape suitable May be used for thread sealant Teffon tape is the only sealant ar antiseize compound, graphite-petrolatum Heavy paste composed of 50% g	Comment: Pure Teflon ribbon tape sultable for oxygen system connections. Comment: May be used for thread sealant antiseize purposes on liquid and Comment: Teflon tape is the only sealant and antiseize agent that may be antiseize compound, graphite-petrolatum Comment: Heavy paste composed of 50% graphite and 50% petrolatum. Comment: Suitable as an antiseize compound for elevated temperature (3)	for oxygen system connections. antiseize purposes on liquid and gaseous oxygen systems. ad antiseize agent that may be used in oxygen system connections. MIL-T-5544 graphite and 50% petrolatum. and for elevated temperature (350-1200 degrees F).	xeous oxygen system oxygen oxygen system oxygen oxygen system oxygen oxygen system oxygen oxy	stems. rm connections.	2-10	8

				
Env Risk				
				
Indiv Risk				
Time				age - a composition region - a great - a
Quantity				~
Crew Size		. •	- 0	9
Type of Operation servicing Iubrication	lubrication	maintenance	maintenance	maintenance
Other "Suitable Substitutes":				
Current Practice is to use: 9).				

age 2

Comment: Not generally suitable where good sealing properties are required. Comment: Graphite contract (conducting material) necessitates decretion in use for electrical systems. Comment: Graphite contracting conducting materials in the preference of properties and contracting the missing of a contracting to the properties of the pr	Comment: Not generally suitable where good sealing properties are required. Comment: Graphite contract (conducting material) necessitates discribin in use for electrical system. Comment: Operating oil for discript hydraulic systems and landing gen shock shuts. Comment: Operating oil for discript hydraulic systems and landing gen shock shuts. Comment: Should be used in preference to petrolatioum as an antisetze and sedarnt material for all procession prevention in threaded connections in magnesism connections, cluminum with upported steel copper, bross, or boraze. Comment: Took material. Adequate exhaust verification must be in operation at all times while this comment: Took material. Adequate exhaust verification must be in operation at all times while this comment. Took material. Adequate exhaust verification must be in operation at all times while this comment. Took material. Adequate exhaust verification must be in operation at all times while this comment. Took material. Adequate exhaust verification must be in operation at all times while this is comment. Protective clothing including eye shields, rubber safety-toed shoes, plastic covered aproforment. Protective clothing including eye shields, rubber safety-toed shoes, plastic covered aproforment. Apply form-agaket sedant to station 194 bulkhead in accordance with T.O. 1F-5A-3. Comment: During removal and replacement of any parts in the gun gas deflector system. It is importation to be active any approved leaf test compound Comment: Use externe cone when applying leak test compound to face of oxygen filler valve to planting the land to 230 to 250 degrees comment: When checking avgen system for leaks, use only approved leak test compound Comment: When checking both wear special clothing, including face mask, gloves, and approved comment: To test temperature probe. It is submerged in hydraulic off contribute to antiseize compound Comment: To reduce the possibility of seizure, apply a thick contribugor of antiseize.	Chemical	Known As	Commercial Name	Military Name	Reference	FSN	Page	Line
		Comment:	Not generally suitable whe	edord gailing prope	rties are required.				
		Comment	Graphite content (conduc	ting material) necessity	ates discretion in us	e for electrical s	ystems.		
			hydraulic oil		MIL-H-83282				&
		Comment:	Operating oil for aircraft hy		inding gear shock st	hots.			5
		Comment:	Effective 1 November 1981	I, MIL-H-83282 became	the preferred hydro	aulic fluid. MIL-1	H-5606 may, to prever	it groundin	g, be mix
				nce to petrolataum as	an antiseize and se	alant material f	or all hydraulic system	connection	S.
					MIL-P-8116			2-10	37
			putty						
		Comment:	Heavy zinc chromate com	pound to be used for c	corrosion prevention	n in threaded c	onnections between	dssimilar m	etak;
		Comment (con't) magnesium connec	tions, aluminum with ur	plated steel, copp	er, bross, or bro	NZO.		
			carbon remover		MIL-C-25107	1.0.943-1-1		2-19	9
		Comment:	Toxic material. Adequate	exhaust ventilation mu	st be in operation o	nt call times while	this material is in use.	Avoid inh	Matton an
		Comment:	Protective clothing including	ng eye shields, rubber s	safety-toed shoes, p	olastic covered	aprons, and rubber gi	oves must	be wom t
		 trichlorethy				10.943-1-1		2-19	01
			Toxic material. Adequate	exhaust ventilation mu	st be in operation o	nt off times while	this material is in use.	Avoid inh	alation on
			Protective clothing includi	ng eye shields, rubber s	safety-toed shoes, p	olastic covered	aprons, and rubber of	oves must	be wom t
Seciont Comment: Apply fam-a-gasket sealant to station 194 bulkhead in accordance with 1.0. 1F-54-3. Comment: No specific materials listed. Comment: No specific materials listed. Comment: Unbricate all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. Inotational leak test compound Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filler valve to prevent compound from nunring into hydraulic fluid MIL-1-2567 Comment: When checking oxygen system for leaks, use only approved leak test compound to face of oxygen filler valve to prevent compound from nunring into antiseize compound Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. All-1-2544 Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reserval	Sealant Comment: Apply form-a-gasket sealant to station 194 builkhead in accordance with T.O. 1F-5A-3. Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is impossible to spray lubricant and replacement of any parts in the gun gas deflector system, it is impossible to the form that the gun gas deflector system, it is impossible to the form that the gun gas deflector system, it is impossible to the form that the gun gas deflector system, it is impossible to the form that the form that spring guide, spring guide assembly, and spring with spring forment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filter valve to phydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees comment: When handling hot oil, wear special clothing, including face mask, gloves, and apronant antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the f		form-a-gasket			I.O. 1F-5A-3		4-12	3
Comment: Apply form-a-gasket sealant to station 194 bulkhead in accordance with 1.O. 1F-5A-2-11 Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is important that cleaning instructions in 1.C comment: Use care all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. Isak test compound Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filler valve to prevent compound from running into hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clotthing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reservol	Comment: Apply form-a-gasket sealant to station 194 bulkhead in accordance with 1.O. 1F-5A-2-11 Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is importance all bearing surfaces of spring guide, spring guide assembly, and spring with spring forment: Lubricate all bearing surfaces of spring guide, spring guide assembly, and spring with spring forment: Use extreme care when applying leak test compound to face of oxygen filler valve to phydraulic fluid Comment: Use extreme care when applying leak test compound to face of oxygen filler valve to phydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. MIL-1-5544A Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the files.		sectont					4-14	7
Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is important that cleaning instructions in T.C. spray lubricant spray lubricant all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. Comment: Lubricate all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: When checking oxygen system for leaks, use only approved leak test compound. MIL-H-83282 Comment: To fest temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound MIL-T-5544A Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reservol	Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is important spray lubricant and replacement of any parts in the gun gas deflector system, it is important appropriate all bearing surfaces of spring guide, spring guide assembly, and spring with spring beak test compound. Comment: When checking axygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of axygen filler valve to provide a stremperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees comment: When handling hot oil, wear special clothing, including face mask, gloves, and apronative included to reduce the possibility of seizure, apply a thick coating of antiseize compound to the facement: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the facement:	Comment:	Apply form-a-gasket seala	unt to station 194 bulkhe	ead in accordance	with T.O. 1F-5A			
Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is important that cleaning instructions in T.O. Spray lubricant spring guide, spring guide assembly, and spring with spray lubricant. Incomment: Lubricate all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. Incomment: Use extreme care when applying leak test compound to face of oxygen filter valve to prevent compound from running into hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and aprion. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fitter nut before installing the reserval	Comment: No specific materials listed. Comment: During removal and replacement of any parts in the gun gas deflector system, it is impossible spray lubricant spray lubricant with submining surfaces of spring guide, spring guide assembly, and spring with spring comment: Use extreme care when applying leak test compound to face of oxygen filler valve to pring forment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apronative including face mask, gloves, and apronative comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the face of a price of antiseize compound to the face of a price of antiseize compound to the face of a price of					I.O. 1F-5A-2-11		9-12	% :
spray lubricant leak test compound spring guide assembly, and spring with spray lubricant. Spray lubricant spray lubricant leak test compound spring guide assembly, and spring with spray lubricant. 10-5 15 15 15 15 15 15 15	spray lubricant spray spring guide, spring guide assembly, and spring with spring surfaces of spring guide, spring guide assembly, and spring with spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring spring guide, spring guide assembly, and spring with spring guide, spring g	Comment:	No specific materials listed		4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1		<u> </u>
Comment: Lubricate all bearing surfaces of spring guide, spring guide assembly, and spring with spray lubricant. 10-5 15 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5 15 16-5	Comment: Lubricate all bearing surfaces of spring guide, spring guide assembly, and spring with spring fleak test compound Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filter valve to particular to test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apronantial softwents. Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the face.		Commo removal and replace		ine gun gas dellec	ior system, it is it	nporioni mai cieonin		
Comment: When checking surfaces of spring guage, spring guage assention, and spring with spray numeral. 10-5 15 10-5 15 10-5 15 10-5 15 10-7 1	Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filler valve to picture in hydraulic fluid. Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound. Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the f	Common*	Spiroy rubilication		MIL-L-23390	***************************************		<u> </u>	<u>o</u> :
Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filter valve to prevent compound from running into hydraulic fluid NIIL-H-83282 Comment: Other test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reservoil	Comment: When checking oxygen system for leaks, use only approved leak test compound. Comment: Use extreme care when applying leak test compound to face of oxygen filler valve to particular to test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apronants set to reduce the possibility of seizure, apply a thick coating of antiseize compound to the face mask.			cas or spilling galde, spilling	IND GUIDE CASEINON		II ADION MONICOLIII.	3	4
Comment: When handling hot oil, wear special clothing, including of antiseize compound to the filter of the filter nut before installing the reservoil	Comment: When handling boygen system of each test compound to face of oxygen filler valve to pure the extreme care when applying leak test compound to face of oxygen filler valve to pure hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. All-T-5544A Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the f	رکسس	bodino isel abel	of the forth and only	INITELECTION	70000			<u> </u>
Comment: Use exireme care when applying leak rest compound to tace of oxygen met valve to prevent compound from running mo hydraulic fluid NIIL-H-83282 Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. Antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reserval	Comment: Use exireme care when applying leak rest compound to tace of oxygen little hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. Antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the f		WITH CHECKING OXYGEN SY	SIGNI OF ROMS, USE OF IN	approved reak res	compound.		\ \ \ \	کن رخ ج
hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reserval	hydraulic fluid Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the f	Comment:	Use extreme care when a	ppiying leak test comp	ound to tace of oxy	/gen filler valve	to prevent compound	1 TOT CO.	Voice Dis
Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees F. Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reserval	Comment: To test temperature probe, it is submerged in hydraulic oil heated to 230 to 250 degrees Comment: When handling hot oil, wear special clothing, including face mask, gloves, and apron. Antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fi		hydraulic fluid		MIL-H-83282			11-248	8,11
Comment: When handling hot old, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reservoi	Comment: When handling hot oll, wear special clothing, including face mask, gloves, and apron. antiseize compound Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fi	Comment:	To test temperature probe	, it is submerged in hyd	fraulic oil heated to	230 to 250 deg	rees F.		
antiseize compound MIL-T-5544A Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the filter nut before installing the reservol	Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fi	Comment:	When handling hot oil, we	ar special clothing, incl	luding face mask, g	Joves, and apra	'n.		
Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fitter nut before installing the reservoir	Comment: To reduce the possibility of seizure, apply a thick coating of antiseize compound to the fi		antiseize compou	pu	MIL-T-5544A			11-29	ಜ
		Comment:	To reduce the possibility of	fseizure, apply a thick o	coating of antiseize	compound to	the filter nut before ins	talling the	reservoir

d with MIL-H-83282.			_		 . ! ! : : : ;
d with MIL-H-83282.					
	·	·			
_		maintenance			
d skin contact. y personnel handling this material.		cleaning			
108 skin contact.		cleaning			
		maintenance			
		cleaning			
F-5A-2-11 be followed.		lubrication			
D		maintenance			
ressurtzation air fitter element.		maintenance		eran eran da se	

Chemical	Known As	Commercial Name Military Name	Military Name	Reference	NC	308	2
	solvent	,	7-7-086)	1
Comment: Ck	Comment: Clean sight gage glass with solvent P-D-680 or equivalent.	n solvent P-D-680 or eq	uivalent.			11-308	8
	clear lacquer		MIL-L-19537			}) }
Comment: Se	Comment: Seal edges of temperature tape	tape with clear lacquer.	Jer.			12-1	F
	rain repellent fluid		•			Difference of	: <u>¥</u>
Comment: Re	Comment: Repellent fluid is a proprietary formulation supplied in throwaway type derosal containers pressured with time year year.	tary formulation supplik	ed in throwaway ty	pe derosol cont	CINOIS pressured will		ġ
Comment: Ins	Comment: Installation, removal, and residue clean-up are covered in 1.0. 1F-5A-2-2.	residue clean-up are c	overed in T.O. 1F-5	A-2-2.			

A COOPIES			
Operation Crew Size Guanning cleaning		_ Ø_	
Operation cleaning	painting	maintenance	
Other "Suitable Substitutes":			
Current Practice is to use:			

Page 6

Developed by: Capt Janice M. Govern 10.154.2-6 Powerplant 10.150.2-10 Power It operated by Indoor It of the Indoor It of In	F-5A Hazaro	F-5A Hazardous Materials Risk Analysis	alvsis					
	Developed	by: Capt Janice M. G	Savern	Current as of: Dece	mber 1992			
	T.O. 1F-5A-	2-6 Powerplant						
	Basic: 1 Ma	ıy 1971 through Chan				-		
	Chemical	Known As hydraulic fluid		Military Name MIL-H-83282 or	Reference	FSN	Page 1-46	Line 31
				MILLH-5606				
	Comment:	Maintenance person	nel use a hydraulic tes	t stand to provide e	xternal hydraulic	power tto operate t	the various	aircraft sy
	Comment:	Personnel may be ex	posed to spillage.					
		petrolatum		VV-P-236			2-4	24
	Comment:	Apply to preformed p	oackings.					
		lubricating oil		MIL-L-7808	T.O. 42B2-1-1	-	2-4	27
	Comment:	Lubricate packing gru	ooves, lead-in chamfe	rs, bores, and outsic	te diameters over	which preformed p	ackings m	ust pass.
Comment: Ensure that the engine has been preserved before removal of quick engine change components. Calibration fluid Comment: If fuel flowmeter is to be stored, ensure that flowmeter is filled with calibration fluid to protect internal parts. spray lube Lubricate preformed maring surfaces of the throttle control quick-disconnect rod with a thin film of graphite grease. Spray lube Comment: Coat internal maring surfaces of the throttle control quick-disconnect rod with a thin film of graphite grease. Spray lube Lubricate preformed packing groove and inner surface of right half (of slip-joint coupler) with Lubrit-Cond A. Lubricating oil Lubricating oil All-1-2338 Comment: Coat all afferburner affach boths with Lubricating oil. Antiseize comjulet-lube SS-30 (H-Temp) Comment: Before installing manifold, coat affach both threads with Jet-Lube SS-30 (H-Temp). PEN 8030-180-6315 3-127 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate seals (on fuel inlet manifold mounting stucts) with petrolatum. Oil Nul-1-25681 Comment: Lubricate remote speed control cables with oil.	Comment:	Page 2-4A and 2-5 cc	ontain a chart listing er	ngine lubricants.		:		•
Comment: Ensure that the engine has been preserved before removal of quick engine change components. calibration fluid Comment: If fuel flowmeter is to be stored, ensure that flowmeter is filled with calibration fluid to protect internal parts. spray lube Lubri-Bond Comment: Lubricate preformed packing groove and inner surface of right half (of slip-joint coupler) with Lubricating oil Comment: Coat internal marking surfaces of the throttle conflowed coat internal packing groove and inner surface of right half (of slip-joint coupler) with Lubricate preformed packing groove and inner surface of right half (of slip-joint coupler) with Lubric-Coat affecting an antiseize complete under affect both swith Lubricating oil Comment: Before installing manifold, coat affects both threads with Jet-Lube SS-30 (Hi-Temp) Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VV-P-236 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. VI MIL-L-2681 Comment: Lubricate preformed packing (on fuel flowmeter transmitter) with petrolatum. Oil Comment: Lubricate preformed packing (on fuel floweder with oil.) All-L-2681 Comment: Lubricate preformed packing (on fuel floweder with oil.) All-L-2681 Comment: Lubricate preformed packing (on fuel floweder with oil.) All-L-2681 Comment: Lubricate preformed packing (on fuel floweder with oil.)		preservative			1.0, 21-185-66-1		3-100	6
Comment: If fuel flowmeter is to be stored, ensure that flowmeter is filled with calibration fluid to protect internal parts. Spray lube Lubri-Bond Lubri-Bo		Ensure that the engin	e has been preserved	before removal of c	quick engine cha	nge components.		
Ispray lubeG-21164 antrol quick-disconnect rod with a thin film of graphite greaseL-23398 -L-23398 -L-7808 goil. FSN 8030-180-6315 3-119 8-121 -P-236 gstuck) with petrolatumP-236 gstuck) with petrolatumP-236 gstuck) with petrolatumP-236 gstuck) with petrolatumP-236		calibration flui	. 70	MIL-F-7024			3-100L	13
Ispray lubeG-21164 3-110 antrol quick-disconnect rod with a thin film of graphite greaseL-23398 -L-23398 -L-7808 -L-2368 -L-25681	Comment:	If fuel flowmeter is to	be stored, ensure that	flowmeter is filled w.	ith calibration flui	d to protect internal	parts.	•
1 spray lube. -G-21164 antrol quick-disconnect rod with a thin film of graphite greaseL-23398 -L-25681 3-110 3-111 FSN 8030-180-6315 3-127 3-129 3-129 3-129		spray lube	Lubri-Bond			FSN 9150-754-0064	3-103	ဗ
3-110 antrol quick-disconnect rod with a thin film of graphite grease1-23398 3-111 a surface of right half (of slip-joint coupler) with Lubritl-Cond A1-7808 goil. FSN 8030-180-6315 3-119 8-236 artansmitter) with petrolatum2-236 3-127 3-129 3-129 3-120-236 3-132	Comment:	Lubriciate trunnion m	ount balls with Lubri-Bo	and spray lube.				
antrol quick-disconnect rod with a thin film of graphite grease. 1-1-23398 3-111 3-111 3-116 19 oil. FSN 8030-180-6315 3-119 & 3-121 -P-236 9 stuck) with petrolatumP-236 9 stucks with petrolatumP-236 9 stucks with petrolatumP-25681	_	graphite great	9	MIL-G-21164			3-110	,
-t-2398 -t-2398 -t-2398 -t-2398 -t-7808 -t-2368 -t-25681	Comment:	Coat internal mating	surfaces of the throttle	control quick-disco	unnect rod with a	thin film of graphite	grease.	
r surface of right half (of slip-joint coupler) with Lubrit-Cond A. -L-7808 3-116 1g oil. FSN 8030-180-6315 3-119 & 3-121 -P-236 g studs) with petrolatumP-236 3-129 3-129 3-129		spray lube	Lubri-Bond A	MIL-L-23398		- •	3-111	13
-L-7808 -L-7808 -L-7808 -L-7808 -Lube SS-30 (Hi-Temp)P-236 -P-236 -P-236 -P-236 -P-236 -P-236 -P-236 -P-236 -P-236 -P-25681	Comment:	Lubricate preformed	packing groove and i	nner surface of right	half (of slip-joint	coupler) with Lubril-C	Cond A.	
ng oil. FSN 8030-180-6315 3-119 & 3-121 -p-236 er transmitter) with petrolatump-236 stuck) with petrolatum236 3-129 3-129 3-129		Inbricating oil	;	MIL-L-7808	•		3-116	8
FSN 8030-180-6315 3-119 & 3-04s with Jet-Lube SS-30 (Hi-Temp). 9-236 9-236 9-236 9-236 9-25681 3-132	Comment:	Coat all afferburner c	attach bolts with lubric	atling oil.				
eads with Jet-Lube SS-30 (Hi-Temp). 3-121 3-127 er transmitter) with petrolatumP-236 3-129 3 stuck) with petrolatum. 3-132		antiseize com	Jet-lube SS-30 (HI-Tem	(a			3-119 &	16
-P-236 er transmitter) with petrolatumP-236 3-129 stucks) with petrolatum. 3-132	Comment:	Before installing manif	fold, coat attach bolt	threads with Jet-Lub	e SS-30 (Hi-Temp)		3-121	8
er transmitter) with petrolatumP-236 3-129 3 stuck) with petrolatum. 3-132		petrolatum		VV-P-236	•		3-127	79
9-236 3 stuck) with petrolatum. 3-132	Comment:	Lubricate preformed	packing (on fuel flown	neter transmitter) wt	th petrolatum.			-
y stuck) with petrolatum. -L-25681		petrolaturn		VV-P-236				8
3-132	Comment:	Lubricate seals (on fu	el intet manifold moun	fing stucts) with petro	olatum.			
		· · · · · · · · · · · · · · · · · · ·		MIL-L-25681			3-132	4
	Comment:	Lubricate remote spe	ed control cables with	oil.	_	-		

	4				,
			Ü		
a ruccince is to use:	Cinet suitable substitutes :	maintenance	ozic Maro	¥:	New Appli
		lubrication			
		lubrication			
	,				
		lubrication		-	
		lubrication Inbrication lubrication			
		lubrication			
		lubrication			

Chemical	Known As C.	Commercial Name	Military Name	Reference	FSN	Page	Line
	vapor degrease			1.0. 2J-1-13		3-148	0
Comment:	Comment: Vapor degrease parts in accordance with Process 1, T.O. 2J-1-13.	n accordance with I	Process 1, T.O. 2J-1-1	.5.		······································	
	acetone	:	O-A-51			3-148	27
Comment:	Comment: Rinse parts in clean reager	igent grade acetone, and air dry.), and air dry.				
	solid film lubricant	=			FSN 9150-964-9228 3-148	3-148	32
Comment:	Comment: Use Solid Film Lubricant to	to fubricate parts.			FSN 9150-964-9244		
				T.O. 1F-5A-3		3-152	ري د
Comment:	Comment: The engine bay firewalls must be cleaned at prescribed intervals to prevent buildup of residue.	s must be cleaned a	nt prescribed interva	its to prevent buil	dup of residue.		
	high-temperature sealant	re sectiont		T.O. 1F-5A-3		3-152	7
Comment:	Comment: If any firewall access panels are removed the panels must be resealed with high-temperature sediant.	anels are removed the	ne panels must be re	sealed with high	n-temperature sealar	÷	
	<u>&</u>	Rust-Lick No. 606	•	1.0. 23-3185-102		3-153	•
Comment:	Comment: Clean the engine compressor section using reverse Rust-Lick and water-wash.	pressor section using	reverse Rust-Lick an	d water-wash.			
	corrosion prevWD-40	√ 0-40	i .	1.0. 2J-J85-102		3-153	61
Comment:	Comment: Use only WD-40 or Rust-Lick	Lick No. 606 to prese	No. 606 to preserve engine. Do not mix WD-40 and Rust-Lick.	mix WD-40 and I	Pust-Lick.	·	
	insulation blanket	ţe.				4-4	21
Comment:	Comment: This is the compressor casin	asing insulation blanket.	ket.				
	antiseize com Ease-Off 990	OSG-Off 990			FSN 8030-664-6146	4-44	9
	graphite silicone grease		MIL-A-907		FSN 9150-735-1800	4-44	7
Comment:	Comment: Lubricate threads on flexible	exible drive shaft cou	ipling nuts with antis	eize compound	e drive shaft coupling ruts with antiseize compound or graphife silicone grease.	Jeose.	
	ō		MIL-L-7808			2 8	∞
Comment:	Comment: All line fittings on fuel control should be jubricated with oil.	ontrol should be lubri	cated with oil.				
	solvent		P-D-680 Type II			5-8	22
Comment:	Comment: Clean gearbox axis D shaftgear internal splines with P-D-680 Type II pressurized at 25 psig with shop air.	haftgear internal spli	nes with P-D-680 Typ	oe il pressurized c	nt 25 psig with shop c	Ĕ.	
	grease	Plasti-lube Moly No.3			FSN 9150-823-0845	8	જ
Comment:	Comment: Lubricate pump splined shaft and gearbox axis D internal spline sparingly with grease	3 shaft and gearbox	axis D internal spline	sparingly with g	rease.		
	antiseize compound	punc	MIL-T-5544			28	37
Comment:	Comment: Lubricate threads of the four studs on engine gearbox mounting pad with antiseize compound.	e four studs on engin	e gearbox mountin	g pad with antisk	eize compound.		
	antiseize compound	bund	MIL-T-5544	~		5-10	7
Comment:	Comment: Lubricate threads of fuel in	el inlet manifold mou	let manifold mounting studs with antiseize compound.	iseize compound	Ţij.		
	petrolatum		W-P-236		- •	5-10	9
Comment:	Comment: Lubricate fuel inlet manifold seals with petrolatum.	aifold seals with petro	Matum.				
	petrolatum		W-P-236			5-10	ઋ
Comment:	Comment: Lightly lubricate the three preformed packings (on the main fuel pump) with petrolatum.	ee preformed packi	ngs (on the main fue	ed umb) with be	trolatum.		

Current Practice is to use:	Other 'Suitable Substitutes':	Type of Operation cleaning	Crew Size	Quantify Time	Time	Indiv Risk
		cleaning	~			
		lubrication	···			: .
	-	cleaning		:		
		reseating				
		cleaning				:
		preserving		4 025		
		maintenance				
		lubrication lubrication				
		lubrication				
		cleaning				
		lubrication				
		lubrication				
		lubrication				
		lubrication				
		lubrication	~ =====================================			:
						

Chemical	Known As	Commercial Name	Military Name	Reference	FSN	a	Line
	antiseize compound	punod	MIU-T-5544			5-10	ස
Comment:	Comment: Lubricate studs (for the main fuel pump) with antiseize compound	w (dund lael pump) wi	th antiseize compou	nd.			
	petrolatum					510A	14
Comment:	Comment: Lubriciate packing (for the	or the high pressure re	high pressure relief valve cover) with petrolatum before installation.	petrolatum befo	re installation.		
	antiseize com Ease-Off 990	Ecse-Off 990			FSN 8030-664-6146	511	15
	graphite silicone grease	ne grease	MIL-A-907			5-11	92
Comment:	Comment: Lubricate threads on the four bolts (on the main fuel nozzel) with antiseize compound or graphite silicone grease.	the four bolts (on the	main fuel nozzel) with	h antiseize comp	ound or graphite sili	cone grea	9
	petrolatum		W-P-236			5-13	35
Comment:	Comment: Lubricate preformed packing (main fuel control filter) with petrolatum.	packing (main fuel co	ontrol filter) with petro	olatum.			
	ō		MIL-L-7808			5-13	37
Comment:	Comment: Apply oil to threads of access plug (main fuel control filter).	of access plug (main fi	uel control fitter).				
	petrolatum		W-P-236			5-15	10
Comment:	Comment: Lubricate new preformed packing (main fuell ipump filter) with petrolatum.	med packing (main fu	uell bump filter) with	petrolatum.			
	ō		MIL-L-7808			5-15	12
Comment:	Comment: Apply oil to threads of cap		and spring assemble on the main fuel pump filter.	el pump filter.			
	solvent		P-D-680 Type II			5-18	12
Comment:	Comment: Using solvent P-D-680 pressurized at 25 psi with shop air, blast-flush internal splines on the overspeed governor.	pressurized at 25 psi v	vith shop air, blast-flu	sh internal splines	on the overspeed	governor.	
	grease	Plostilube Moly No. 3			FSN 9150-823-8045	5-18	8
Comment:	Comment: Lubricate mating splines on governor and gearbox with grease	nes on governor and	gearbox with grease				
	degreasing solvent	lvent	0-1-634			5-19	24
Comment:	This procedure uses an ultrasonic cleaning unit. If one is not available, clean filter elements in accordance with T.O. 2J-1	an ultrasonic cleaning	unit. If one is not ave	allable, clean filte	elements in accor	rdance with	1.0.21-1
Comment:		Clean filter parts except preformed packings and filter element by washing in degreasing solvent	gs and filter element	by washing in de	agreasing solvent.		
Comment:		This procedure also applies to the oil filter parts.	orts.				
	carbon remov	carbon remover compound	MIL-C-25107			5-19	27
Comment:	Comment: Soak filter element for 30 minutes in carbon remover compound before placing element in uttrasonic cleaning unit	r 30 minutes in carbor	remover compound	d before placing	element in uttrasoni	c cleaning	ŧ.
Comment:	This procedure also applies	applies to the oil filter element.	lement.			7-13	ෙළ
	cleaning fluid		P-C-111			5-19	31
			P-C-436			5-19	31
Comment:	Comment: Place filter element into steel basket in ultrasonic cleaning tank for one hour.	nto steel basket in ulfro	sonic cleaning tank	for one hour.			
Comment:	Comment: This procedure applies to the main fuel control filter and to the main fuel pump filter.	es to the main fuel cor	ntrol filter and to the	main fuel pump f	Her.		
Comment:	Comment:It also applies to the afferburner high-pressure filter and the afferburner fuel control filter.	fferburner high-pressu	re filter and the after	burner fuel contr	ol filter.		
Comment:	Comment: It also applies to the oil filter	oil filter element.	- •			7-13	ઝ
	solvent		P-D-680 Type II			6-12	13
Comment:	Comment: Use P-D-680, pressurtzed at		25 psig, to blast-flush internal splines on the afterburner fuel control and pump assembly	on the afferburn	er fuel control and p	esso dund	nbly.

Indiv Risk												+	
Time													
Quantity Time												P	
Crew Size		A. J. J. Landson and Co.		···				•					
Type of Operation lubrication	lubrication	lubrication lubrication	lubrication	lubrication	lubrication	lubrication	cleaning	lubricate	cleaning	cleaning	cleaning	cleaning	cleaning
Other "Suitable Substitutes":													
Current Practice is to use:				.					13.	 			

Ings on the fuel control should be lubricated with oil. Sase Prostitube Moly No. 3 anticutum rule pump splined shaft and gearbox axis E shaftgear internal apiline with grease. Informed packing sed on afterburner fuel control and pump assembly with petrolarum. International packing sed on afterburner fuel control and pump assembly with petrolarum. International packing sed on afterburner fuel control and pump assembly with petrolarum. International packing sed on afterburner fuel control and pump with petrolarum. International packings on afterburner fuel pump with antiseize compound. International packings on afterburner fuel pump with petrolarum. International packings for the afterburner fuel pump with petrolarum. International packings for the afterburner fuel control filter with petrolarum. International packings for the afterburner fuel control filter with petrolarum. International packing for the afterburner fuel control filter. International for the afterburner fuel for fuel fuel for fuel fuel for fuel fuel fuel for fuel fuel fuel fuel fuel fuel fuel fuel	Chemical	own As	Commercial Name	Military Name	Reference	FSN	Page	Line
Comment: Lubricate affecture in telescoring study to lubricated with oil. Comment: Lubricate affecturer fuel pump splined shaft and gearbox case is shaftgear internal aptine with grease. VV-P.236 Comment: Lubricate preformed pocking seal on affecturer fuel control and pump assembly with petrolarum. VV-P.236 Comment: Lubricate preformed pocking seal on affecturer fuel control and pump assembly with petrolarum. Instruction preformed pocking seal on affecturer fuel control and pump assembly with petrolarum. Instruction preformed pocking seal on affecturer fuel pump with petrolarum. VV-P.236 Comment: Lubricate fuel inlet manifold mounting studs with petrolarum. Instruction preformed pockings on affecturer fuel pump with petrolarum. VV-P.236 Comment: Lubricate preformed pockings on affecturer fuel pump with petrolarum. Comment: Lubricate preformed pockings on affecturer fuel pump with petrolarum. Comment: Lubricate preformed pockings for the affecturer fuel control filter. Comment: Lubricate preformed pockings for the affecturer fuel control filter. Comment: Lubricate preformed pocking for the affecturer fuel control filter. Comment: Lubricate preformed pocking for the affecturer fuel control filter. Comment: Lubricate freads of all coupling nuts for the affecturer main fuel manifold with oil. Comment: Lubricate freads on affecturer main strolyber with oil. Comment: Lubricate freads on affecturer main strolyber with oil. Comment: Lubricate freads on affecturer main strolyber with oil. Comment: Lubricate freads on affecturer main strolyber with oil. Comment: Lubricate freads on affecturer main strolyber with oil. Activity of the affecturer fuel to be affectured by petrolarum. Apply oil to threads on affetturer for the affecturer main fuel control filter. Comment: Lubricate freads on affetturer for the affetturer fuel of brand screws to be installed with the oil persoyol and of burney with oil be petrolarum. Activity of bettod for the affetturer fuel of brand screws to be installed burney.		NO.		MIL-L-/808			6-12	32
Comment: Lubricate and electronic splined start and geachox axis & shaftgear internal opine with geaces. Comment: Lubricate threads of their international periodium. Comment: Lubricate threads of their international mounting studs with antiseze compound. Comment: Lubricate threads of their international mounting studs with periodium. Comment: Lubricate threads of their international mounting studs with periodium. Comment: Lubricate threads of their international mounting studs with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel pump with periodium. Comment: Lubricate studs for the afterburner fuel control filter with periodium. Comment: Apply al to threads of afterburner fuel control filter. Comment: Lubricate preformed pocking for the afterburner fuel control filter. Comment: Lubricate threads of all coupling ruts for the afterburner fuel control filter. Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Comment: Lubricate threads or all coupling ruts for the afterburner pilot fuel manifold with oil. Comment: Lubricate threads or all coupling ruts for the afterburner pilot fuel manifold with oil. Comment: Lubricate threads or afterburner man sprayed and screws to be installed with the oil reservor and oil pump with periodium. Comment: Lubricate threads on afterburner man sprayed and screws to be installed with the oil reservor and oil pump with periodium. Comment: Lubricate threads on engine geatbox and all boils are servor and oil pump with periodicum. Comment: Lubricate manifile geatbox and all boils are servor and oil pump with periodicum.	Comment:	All line fiftings on the	fuel control should be	lubricated with oil.		2000 000 000		ı,
Comment: Lubricate preformed packing seal on afterburner fuel control and pump assembly with perfolation. 6-13 39	Comment	Lubricate afferbumer		 afficient department axis	E E chaffagar inte	FSN 9150-823-8045	21 6 8	ક
Comment: Lubricate preformed packing sed on afterburner fuel control and pump assembly with petrolatum. Interests of fuel inter manifold mounting studs with antisetee compound. Interests of fuel interests of one of interests on one of interests of one one of interests		petrolatum		W-P-236			€ 12	8
Comment: Lubricate treads of fuel inter manifold mounting studs with antisetse compound. Petrolatura Petrol	Comment:	Lubricate preformed	packing seal on affert	ourner fuel control a	and pump assemi	bly with petrolatum.	! !) .)
Comment: Lubricate threads of fuel linet manifold mounting studs with antiseize compound. VV-P-236 VV-P-236 VV-P-236		antiseize com	punod	MIL-T-5544	•		6-13	30
Comment: Lubricate fuel inlet manifold seaks with petrolatum. Petrolatum Comment: Lubricate fuel inlet manifold seaks with petrolatum. Comment: Lubricate preformed packings on afterburner fuel pump with petrolatum. Comment: Lubricate stucks for the afterburner fuel pump with antiseize compound. Comment: Lubricate stucks for the afterburner fuel pump with petrolatum. Comment: Lubricate preformed packings for the afterburner high-pressure filter with petrolatum. Comment: Apply of to threads of afterburner high-pressure filter with petrolatum. Comment: Apply of to threads of afterburner fuel control filter. Comment: Apply of to threads of all coupling nuts for the afterburner fuel control filter. Comment: Lubricate threads of all coupling nuts for the afterburner plot fuel manifold with oil. Comment: Lubricate threads on afterburner main spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Comment: Lubricate threads on afterburner main spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Comment: Lubricate threads on afterburner main spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Comment: Lubricate threads on afterburner plot spraybar with oil. Anti-SS44 Comment: Lubricate ear: Inperformed packing to be installed with the oil reservoir and oil pump with petrolatum.	Comment:	Lubricate threads of t	tuel inlet manifold mou	infing studs with ant	iseize compound			
Comment: Lubricate fuel frilet manifold seads with petrolarum. VA-P-236 Comment: Lubricate preformed packings on affectuare fuel pump with petrolarum. Comment: Lubricate preformed packings for the affectuare fuel pump with petrolarum. Comment: Lubricate preformed packings for the affectuare fuel comment. Lubricate preformed packings for the affectuare fuel comment. Lubricate preformed packings for the affectuare fuel control filter with petrolarum. VA-P-236 Comment: Lubricate preformed packing for the affectuare fuel control filter. Comment: Lubricate new preformed packing for the affectuare fuel control filter. All L-7806 Comment: Lubricate new preformed packing for the affectuare fuel control filter. Oil Mill-1-7806 Comment: Lubricate threads of all coupling ruts for the affectuare main fuel manifold with oil. Oil Comment: Lubricate threads or affectuare main spraybar with oil. Mill-1-7808 Comment: Lubricate threads on affectuare main spraybar with oil. Oil Comment: Lubricate threads on affectuare main spraybar with oil. Mill-1-7808 Comment: Lubricate threads on affectuare main spraybar with oil. All Definition for the affectuare main spraybar with oil. All Definition for threads on affectuare main spraybar with oil. All Definition for threads on affectuare main spraybar with oil. All Definition for threads on affectuare main spraybar with oil. All Definition for threads are affectuare main spraybar with oil. All Definition for the petrolarum oil position with the oil reservoir and oil pump with petrolarum.		petrolatum		W-P-236			6-13	4]
Comment: Lubricate preformed pockings on afterburner fuel pump with petrolatum. Comment: Lubricate structs for the afterburner fuel pump with antiseze compound. Comment: Lubricate structs for the afterburner fuel pump with antiseze compound. Comment: Lubricate preformed packings for the afterburner high-pressure filter with petrolatum. Comment: Lubricate preformed packings for the afterburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afterburner fuel control filter with petrolatum. Comment: Lubricate new preformed packing for the afterburner fuel control filter. Comment: Lubricate new preformed packing for the afterburner fuel control filter. Oil Mill-17808 Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Oil Mill-17808 Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Oil Mill-17808 Comment: Lubricate threads on afterburner pilot spraybar with oil. Oil Mill-17808 Comment: Lubricate mecuniting studs on engine gearbox with oil. Anti-17808 Comment: Lubricate mecuniting studs on engine gearbox and all bots and screws to be installed with the oil reservor and oil pump with petrolatum. Description. Oil Comment: Lubricate each preformed pocking to be installed with the oil reservor and oil pump with petrolatum.	Comment:	Lubricate fuel inlet mo	anifold seals with petro	Matum.	•			
Comment: Lubricate preformed packings on afferbumer fuel pump with petrolarum. Comment: Lubricate stucts for the afferbumer fuel pump with antiseize compound. Comment: Lubricate stucts for the afferbumer fuel pump with antiseize compound. Comment: Lubricate preformed packings for the afferbumer high-pressure fitter with petrolarum. Comment: Lubricate preformed packing for the afferbumer high-pressure fitter with petrolarum. Comment: Lubricate new preformed packing for the afferbumer fuel control fitter. Comment: Lubricate new preformed packing for the afferbumer fuel control fitter. Comment: Lubricate threads of access plug for the afferbumer fuel control fitter. Comment: Lubricate threads of all coupling ruts for the afferbumer plot fuel manifold with oil. Comment: Lubricate threads on afferbumer plot sprayboar with oil. Comment: Lubricate threads on afferbumer plot sprayboar with oil. Comment: Lubricate threads on afferbumer plot sprayboar with oil. Comment: Lubricate macunting studs on angine gearbox and all boths and screws to be installed with the oil reservoir and oil pump. Comment: Lubricate eac:n preformed packing to be installed with the oil reservoir and oil bump. Comment: Lubricate eac:n preformed packing to be installed with the oil reservoir and oil bump. Comment: Lubricate eac:n preformed packing to be installed with the oil reservoir and oil bump.		petrolatum	:	W-P-236	••		6-14	8
comment: Lubricate struck for the afferburner fuel pump with antiseize compound. Comment: Lubricate struck for the afferburner fuel pump with antiseize compound. VV-P-28 Comment: Lubricate preformed packings for the afferburner high-pressure filter with petrolarum. Oil Mil-1-7808 Comment: Lubricate new preformed packing for the afferburner fuel control filter. Apply oil to threads of access plug for the afferburner fuel control filter. Oil Mil-1-7808 Comment: Lubricate threads of all coupling ruts for the afferburner fuel manifold with oil. Oil Mil-1-7808 Comment: Lubricate threads or afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Oil Mil-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment: Lubricate threads on afferburner main spraybor with oil. Anti-1-7808 Comment with petrolar main spraybor with oil threads or afferburner main spraybor with	Comment:	Lubricate preformed	packings on afferbur	er fuel pump with p	etrolatum.			
Comment: Lubricate studs for the afferburner fuel pump with antiseize compound. VV-P-236		antiseize com	punod	MIL-F-5544			614	8
Comment: Lubricate preformed packings for the affebuner high-pressure filter with petrolatum. Mil.1-7808	Comment:	Lubricate studs for the	e afferburner fuel purr	p with antiseize con	nponud.			
Comment: Lubricate preformed packings for the afterburner high-pressure fitter with petrolatum. Comment: Apply oil to threads of afferburner high-pressure fitter head. Petrolatum VV-P-236 Comment: Lubricate new preformed packing for the afferburner fuel control fitter. Oil Milt-1-7808 Comment: Lubricate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. Oil Milt-1-7808 Comment: Lubricate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. Oil Milt-1-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Milt-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Milt-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Milt-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Milt-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Milt-1-7808 Comment: Lubricate main structs on engine gearbox and all boits and screws to be installed with the oil reservoir and oil pump. VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.		petrolatum		W-P-236			6-16	14
Comment: Apply oil to threads of afferburner high-pressure filter head. VV-P-236 VV	Comment:	Lubricate preformed	packings for the after	oumer high-pressure	filter with petrok	atom.		
Comment: Apply oil to threads of afferburner high-pressure fifter head. VV-P-236		70		MIL-1-7808	•		6-16	17
Comment: Lubricate new preformed packing for the afferburner fuel control filter with petrolatum. Oil Mill-L-7808 Comment: Lubricate threads of access plug for the afferburner fuel control filter. Oil Mill-L-7808 Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Oil Mill-L-7808 Comment: Lubricate threads or afferburner main spraybar with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner pliot spraybar with oil. Oil Mill-L-7808 Comment: Lubricate mcunting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump. PAP-236 Comment: Lubricate eac: preformed packing to be installed with the oil reservoir and oil pump. Papertolatum. VV-P-236 Comment: Lubricate eac: preformed backing to be installed with the oil reservoir and oil pump.	Comment:	Apply oil to threads o	f afferburner high-pre	sure filter head.				
Comment: Lubricate new preformed packing for the afterburner fuel control filter with petrolatum. Oil Comment: Apply oil to threads of access plug for the afterburner fuel control filter. Oil Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Oil Comment: Lubricate threads of all coupling ruts for the afterburner plot fuel manifold with oil. Oil Oil Aill-1-7808 Comment: Lubricate threads on afterburner main spraybar with oil. Oil Aill-1-7808 Comment: Lubricate threads on afterburner plot spraybar with oil. Aill-1-7808 Comment: Lubricate threads on afterburner plot spraybar with oil. Aill-1-7808 Comment: Lubricate main study on engine gearbox and all botts and screws to be installed with the oil reservoir and oil pump. VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.		petrolatum		W-P-236	-		6-16	32
Comment: Apply oil to threads of access plug for the afterburner fuel control filter. Oil Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Oil Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Oil Comment: Lubricate threads on afterburner main spraybar with oil. Oil Comment: Lubricate threads on afterburner pilot spraybar with oil. Oil Comment: Lubricate threads on afterburner pilot spraybar with oil. Anti-1-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. Anti-1-5544 Comment: Lubricate mounting studs on engine gearbox and all botts and screws to be installed with the oil reservoir and oil pump petrolarum. VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolarum.	Comment:	Lubricate new prefor		ifterburner fuel cont	rol filter with petra	olatum.		
Comment: Apply oil to threads of access plug for the afterburner fuel control filter. oil Comment: Lubricate threads of all coupling nuts for the afterburner main fuel manifold with oil. oil Comment: Lubricate threads of all coupling nuts for the afterburner pilot fuel manifold with oil. oil AMIL-L-7808 Comment: Lubricate threads on afterburner main spraybar with oil. oil AMIL-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. oil AMIL-L-7808 AMIL-L-7808 Comment: Lubricate threads on afterburner pilot spraybar with oil. AMIL-L-7808 Comment: Lubricate means afterburner pilot spraybar with oil. AMIL-L-7808 Comment: Lubricate means afterburner pilot spraybar with oil. AMIL-L-7808 Comment: Lubricate with the oil reservoir and oil pump with the oil reservoir and oil pump with petrolatum.				MIL-L-7808			6-16	8
Comment: Lubricate threads of all coupling ruts for the afferburner main fuel manifold with oil. Comment: Lubricate threads of all coupling ruts for the afferburner pilot fuel manifold with oil. Comment: Lubricate threads on afferburner main spraybar with oil. Oil Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil All-L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. Oil All-L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. All-L-7808 Comment: Lubricate manifold spraybar with oil. All-L-7808 Comment: Lubricate manifold spraybar with oil. All-L-7808 Comment: Lubricate accompand All-L-7808 All-L-7808 Comment: Lubricate accompand All-L-7808 All-L-7808 Comment: Lubricate accompand All-L-7808	Comment:	Apply oil to threads o	faccess plug for the c	ifferburner fuel cont	rol filter.	-) -	
Comment: Lubricate threads of all coupling ruts for the afterburner main fuel manifold with oil. Oil Comment: Lubricate threads of all coupling ruts for the afterburner pilot fuel manifold with oil. Oil Oil Oil Oil Oil Oil Oil		ō		MIL-L-7808			6-20	7
Comment: Lubricate threads of all coupling nuts for the afterburner pilot fuel manifold with oil. Comment: Lubricate threads on afterburner main spraybar with oil. Comment: Lubricate threads on afterburner pilot spraybar with oil. Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseze compound MIL-1-5544 Comment: Lubricate mcunting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump petrolarum. Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolarum.	Comment:	Lubricate threads of c	all coupling nuts for the	afferbumer main f	uel manifold with	<u>9</u> .		
Comment: Lubricate threads of all coupling nuts for the afferburner pilot fuel manifold with oil. Oil Mill-L-7808 Comment: Lubricate threads on afferburner main spraybar with oil. Oil Mill-1-7808 Comment: Lubricate threads on afferburner pilot spraybar with oil. antiseize compound Mill-1-5544 Comment: Lubricate mcunting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump petrolarum. VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolarum.		7		MIL-L-7808	•		6-20	28
Comment: Lubricate threads on afferburner main spraybar with oil. Oil Comment: Lubricate threads on afferburner pilot spraybar with oil. Comment: Lubricate threads on afferburner pilot spraybar with oil. antiseize compound Mill-1-5544 Comment: Lubricate mounting studs on engine gearbox and all botts and screws to be installed with the oil reservoir and oil pump VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump T-6 Z2	Comment:	Lubricate threads of c	all coupling nuts for the	afferburner pilot fu	iel manifold with	. To		-
Comment: Lubricate threads on afterburner main spraybar with oil. oil Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound NIIL-1-5644 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.		70		MIL-L-7808			6-20A	22
oil Comment: Lubricate threads on afterburner pilot spraybar with oil. antiseize compound MIL-T-5544 Comment: Lubricate mcunting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.	Comment:	Lubricate threads on	afferburner main spra	ybar with oil.				
Comment: Lubricate threads on afferburner pilot spraybar with oil. antiseize compound MIL-T-5544 Comment: Lubricate mounting studs on engine gearbox and all botts and screws to be installed with the oil reservoir and oil pump VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.		- ·		MIL-L-7808	·	•••	6-20A	37
antiseize compound MIL-T-5544 Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump petrolarum VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolarum.	Comment:	Lubricate threads on	afferburner pilot spray	bar with oil.	***			
Comment: Lubricate mounting studs on engine gearbox and all bolts and screws to be installed with the oil reservoir and oil pump petrologrum VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.		antiseize comp	punoc	MIL-T-5544	•		4	8
Petrolarum VV-P-236 Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolarum.	Comment:	Lubricate mounting st	uds on engine gearbo	x and all bolts and	screws to be inst	affed with the oil rese	evoir and	y owno ji
Comment: Lubricate each preformed packing to be installed with the oil reservoir and oil pump with petrolatum.	ı	petrolarum		W-P-236			7.6	- 23
	Comment:	Lubricate each prefor	rmed packing to be in	istalled with the oil r	eservoir and oil p	ump with petrolatur	ċ	

Current Practice is to use:	Other "Suitable Substitutes":	Type of Operation Lubrication	Crew Size	Quantity Time		Indiv Risk
	1	lubrication				,
		lubrication				
		lubrication				
		lubrication	-			
		lubrication				<u> </u>
		lubrication			***	
		lubrication				
110		Nubrication	-	• • • • • • • • • • • • • • • • • • • •		
		lubrication				
		lubrication		a magamanan agan -		
		lubrication				
		lubrication				
		lubrication				
		lubrication		 -		
edestro diff		lubrication		•••	-	
		lubrication				

Chemical	Known As Compound antiseize compound	nercial Name I	Milliary Name MIL-T-5544	Kererence	Š	8 %	8 8
comment:	Lubricate mounting:	Comment: Lubricate mounting studs on oil pump with antiseize compound oil	antiseize compound MIL-L-7808	7		7-6	37
comment:	Lubricate spline of oil pump antiselze compound	Comment: Lubricate spline of oil pump and mating spline in engine gearbox with oil. antiselze compound MIL-T-5544	ine in engine gearb MIL-T-5544	ox with oil.	-	7-7	12
comment:	Comment: Apply antiseize compound	pound to line connecti	to line connections on top of oil reservoir. MIL-L-7808	ervolr.		7-8	
comment:	Comment: Before attaching oil cooler petrolatum	cooler lines, lubricate c	lines, lubricate connecting fittings with oil. [VV-P-236]			7-8	12
comment:	Comment: Lubricate new prefortichloroethylene tric	Comment: Lubricate new preformed packings for the oil cooler installation with petrolatum trichloroethylene tric	oil cooler instalfation 0-1-634	with petrolatur	· •	7-10	12
comment:	Clean all parts of the petrolatum	Comment: Clean all parts of the oil filter assembly with trichloroethylene.	trichloroethylene. VV-P-236	•		7-10	೫
comment:	Lubricate new prefort petrolatum	Comment:Lubricate new preformed packing for the oil filter with petrolatum. VV-P-236	filter with petrolatur W-P-236	· દ ે		7-11	2
comment:	Lubricate preformed	Comment: Lubricate preformed packing for the oil pressure transmitter with petrolatum.	ssure transmitter with MILL-7808	h petrolatum.		7-13	4
comment:	Comment: Filt engine oil system with oil degreasing solvent	with oil to the FULL mark on dipstick. Ovent	k on dipstick. O-T-634	•	-	7-13	27
comment:	Comment: Clean oil filter parts, except	_	preformed pacckings and filter element, by washing in degreasing solvent.	ment, by washir	ng in degreasing sc	Jvent.	.
	solvent		P-D-680 Type II			8-4¥	ଛ
comment:	Use P-D-680 pressurt	Comment: Use P-D-680 pressurized at 25 psig with shop air to blast-flush internal splines on the variable exhaust nozzle power unit.	our to blost-flush into	emal splines on	the variable exhau	vod epzzou tsr	Ver unit
comment:	Coat threads of stud	Comment: Coat threads of studs for the variable exhaust nozzle power unit.	MIL-L-/606 ust nozzle power uni	4 -		8	o
	grease	Plastilube Moly No. 3		i	FSN 9150-823-8045 8-6	45 8-6	•
comment:	Comment: Lubricate the mating spline	splines of the exhaust	is of the exhaust nozzle power unit and engine gearbox sparingly with grease	nd engine gear	rbox sparingly with	grease.	
	antiseize compound	punodu			FSN 8030-664-6146	86 8-6	8
	graphite silicone grease	one grease	MIL-A-907		 .	9	8
comment:	Coat threads of vari	Comment: Coat threads of variable exhaust nozzle actuator attach bolts with antiseize compound or graphite silicone grease	fuator attach bolts	with antiseize co	ampound or graph	ife slicone gr	.ease.
			MIL-L-7808	· •		8-13	.
comment:	Service the variable	Comment: Service the variable exhaust nozzle power unit with oil until oil level is even with lower surface of oil check port.	unit with oil until oil is	ivel is even with	lower surface of o	# check port	
	sealing compound	punox	MIL-S-45180			9-5	12
•					:	•	

e Indiv Risk		* *** ************************					en e e i van mager e					<u>.</u>			
Quantity Time															
Crew Size			and the same of th		on gods a signific						may no	• •			
Type of Operation tubrication	lubrication	lubrication	lubrication	lubrication	cleaning	Libration	lubrication	servicing	cleaning	deaning	lubrication	Librication	inbrication inbrication	servicing	secting
Other 'Suitable Substitutes':															
Current Practice is to use:															

Chemical	Known As Commercial Name	ne Military Name	Reference	FSN	Poge	Line
	antiseize compound	MIL-T-5544			9-5	14
Comment:	Comment: Lubricate threads of all screws on the bleed valve assembly with antiseize compound.	leed valve assembly w	ith antiseize comp	sound.		
magnesium	magnesium oxide milk of magnesia			FSN 6505-684-8868	10-12	8
Comment:	Comment: Lubricate threads of engine main igniter plug and lead coupling nut with milk of magnesia.	er plug and lead coupil	ing nut with milk o	f magnesia.		
Comment:	Comment: This also applies to the engine afferburner igniter plug and ignition exciter.	ner igniter plug and ign	ition exciter.		10-20	3,24
	antiseize com Ease-Off 990			FSN 8030-664-6146	10-12	31
	graphite silicone grease	MIL-A-907	• ***		10-12	32
Comment:	Comment: Lubricate threads of four screws and two strap nuts with antiseize compound or graphite silicone grease.	vo strap nuts with antise	eze compound or	graphite silicone gre	XOSE.	
	dry lubricant	MIL-L-23398			10-51	က
	₹	MIL-L-7808			12-9	21
Comment:	Comment: Lubricate atternator-tachometer generator mounting studs.	rator mounting studs.				
	petrolatum	FedSpecW-P-236			12-11	ಜ
Comment:	Comment: Lubricate preformed packings.					
	insulation blankets and shrouds				12-12	17
Comment:	Comment: Engine afterburner section.		 ·			
Magnesium	Magnesium oxide Milk of magnesia			FSN 6506-684-8868	12-12	78
Comment:	Comment: Lubricate diffuser bosses and hamess coupling nuts with milk of magnesia.	oupling nuts with milk o	of magnesia.			
	hydraulic fluid	MIL-H-5606			13-7	38
Comment:	Comment: Prime hydraulic pump by filling pump case thru intake port with hydraulic fluid.	ase thru intake port wil	th hydraulic fluid.			
	solvent	P-D-680 Type II			13-12A	4
Comment:It	Comment:Installing AC generator.					
Comment:	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurzed at 25 psig with shop air.	ef cavity using solvent p	pressurized at 25 p	sig with shop air.		
	antiseize compound	MIL-T-5544			13-13	8
Comment:	Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox	nd to both sides of new	, gasket and insta	# gasket on gearbox.		
	grease Plastilube Moly No. 3	0.3	. <u>.</u> .	FSN 9150-823-8045	13-13	24
Comment:	Comment: Lubricate gearbox internal spline and f	spline and fill relief cavity in back of spline 1/2 full with grease	of spline 1/2 full with	h grease.		
	hydraulic fluid	MIL-H-5606			13-14	7
Comment:	Comment: Before installing hydraulic pump on ac	pump on accessory gearbox, prime pump with red fluid.	pump with red fit	uid.		
	solvent	P-D-680 Type II			13-14	25
Comment:	Comment: Installing hydraulic pump.					
Comment:	Blast-flush internal splines and spline relief cavity using solvent pressurzed at 25 psig with shop air.	ef cavity using solvent	pressurized at 25 p	sig with shop air.		
	antiseize compound	MIL-T-5544			13-14	ઋ
Comment:	Comment: Apply a thin coat of antiseize compound to both sides of new gasket and install gasket on gearbox	nd to both sides of new	/ gasket and insta	# gasket on gearbox.		

Current Practice is to use:	Other "Suitable Substitutes":	Type of Operation lubrication	Crew Size	Quantity Time		Indiv Risk
		lubrication	an san san san an an			
		lubrication lubrication				
		lubrication				
		lubrication lubrication	·			
		lubrication				
		insulation				
122		lubrication			 -	
		dund eulud	······································			
		cleaning	-			
		lubrication				
		lubrication				
		dund eulid				
		cleaning				
		lubrication	an one company			

Chemical	Known As	Commercial Name	Military Name	Reference	FSN	Page	Line
	grease	Plastitube Moly No. 3			0-823-8045	13-14	88
Comment:	Lubricate gearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of	spline 1/2 full with	grease.		
	solvent		P-D-680 Type II			13-20	19
Comment:	Installing Northrop air	Comment: Installing Northrop airframe-mounted gearbox power shaft coupling	ox power shaft cou	pling.			-
Comment:	Blast-flush internal spli	Comment: Blast-flush Internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pr	essurized at 25 p	sig with shop air.		
	grease	Plastilube Moly No. 3		•	45	13-20	31
Comment:	Lubricate gearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of	spline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544		•	13-20	ಜ
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	e compound to both sides of new gasket and install gasket on gearbox	pasket and install	gasket on gearbox.		
· · · · · · · · · · · · · · · · · · ·	solvent		P-D-680 Type II			13-21	42
Comment:	Installing Bendix airfra	Comment: Installing Bendix airframe-mounted gearbox power shaft coupling	x power shaft coupling	ġ			
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pr	essurized at 25 pa	sig with shop air.		
	grease	Plastilube Moly No. 3			45	13-22	10
Comment:	Lubricate gearbox ini	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of	spline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544			13-21	12
Comment:	Apply a thin coat of c	Comment: Apply a thin coat of antiseize compound to both faces of gasket; position gasket and power shaft coupling	both faces of gask	et; position gask	et and power shaft o	onbling o	onto geart
	solvent		P-D-680 Type II	•		13-23	25
Comment:	Installing Northrop en	Comment: Installing Northrop engine gearbox power shaft coupling.	haff coupling.				
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pr	essurized at 25 pa	sig with shop air.		
	grease	Plastilube Moly No. 3		•	3	13-23	88
Comment:	Lubricate gearbox in	Comment: Lubricate gearbox internal spline and fill relief cavity in back of spline 1/2 full with grease	ef cavity in back of	spline 1/2 full with	grease.		
	antiseize compound	punod	MIL-T-5544			13-23	9
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	both faces of gask	et: position gask	e compound to both faces of gasket; position gasket and power shaft coupling onto geard	onbling	anto geard
	solvent		P-D-680 Type II			13-25	36
Comment:	Installing Bendix engli	Comment: Installing Bendix engine gearbox power shaft coupling.	iff coupling.				
Comment:	Blast-flush internal spli	Comment: Blast-flush internal splines and spline relief cavity using solvent pressurized at 25 psig with shop air.	avity using solvent pr	essurized at 25 p	sig with shop air.		
	grease		MIL-G-81322			13-26	6
Comment:	Lubricate engine pov	Comment: Lubricate engine power shaft coupling internal splines and engine gearbox axis B shaff gear (internal) splines with grease	mal splines and eng	ine gearbox axis	B shaff gear (interna) splines v	with grease
	antiseize compound	punod	MIL-T-5544	ŀ		13-26	13
Comment:	Comment: Apply a thin coat of antiseiz	antiseize compound to	both faces of gask	et; position gask	e compound to both faces of gasket; position gasket and power shaft coupling onto geard	coupling	onto geart
	solvent		P-D-680 Type II			13-28	17
Comment:	Replacing Northrop p	Comment: Replacing Northrop power shaft coupling quill shaft.	full shaft.				
Comment:	Blast-flush internal spli	Blast-flush internal splines using solvent pressurized at 25 psig with shop air.	urized at 25 psig with	n shop air.			

Sage 14

grease Lubricate coupling in lubricating oil still gearbox with oil us nate zinc chromate and thin coat of z nate zinc chromate and thin coat of z nt listed. Lubricate cable holes oil leakage measured.	Chemical	Known As	Commercial Name Military Name	_	Keference	FSN	Page	Ene Ene
		grease	Plastilube Moly No. 3	,		FSN 9150-823-8045	13-28	27
Ubricating oil MilL-1-7808 13-29 4 Comment: Fill gearbox with oil using hand oil can. Fill gearbox until oil runs out of filler tube. 14-4 33 Interpretation of zinc chromate putty or mating surfaces of cockpit throttle quadrant assembly. 14-6 30 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-6 30 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable quadrant. 14-8 26 Interpretation of zinc chromate putty to mating surfaces of engine bay cable and a large surfaces of engine	Comment: Lubrice	rte coupling in	temal spline with grea	9 .				
Comment: Fill gearbox with oil using hand oil can. Fill gearbox until oil runs out of filler tube. 2inc chromate zinc chromate putty MIL-P-8116 Comment: Apply a thin coat of zinc chromate putty to mating surface of cockpit throttle quadrant assembly. 2inc chromate zinc chromate putty MIL-P-8116 Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant. No lubricant listed. Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables. Oil Comment: Oil leakage measured in drops per minute.		lubricating oll	:	MIL-L-7808			13-29	4
zinc chromate zinc chromate putty MIL-P-8116 Comment: Apply a thin coat of zinc chromate putty to mating surface of cockpit throttle quadrant assembly. Zinc chromate zinc chromate putty Zinc chromate zinc chromate putty Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant. No lubricant listed. Comment: Lubricate cable holes in pressure seats when installing throttle quadrant cables. Comment: Oil leakage measured in drops per minute.	Comment: Fill ged	arbox with oil us	ing hand oil can. Fill g	pearbox until oil runs	out of filler tube.			
Comment: Apply a thin coat of zinc chromate putty to mating surface of cockpit throttle quadrant assembly. Zinc chromate zinc chromate putty Zinc chromate zinc chromate putty Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant. No lubricant listed. Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables. Comment: Oil leakage measured in drops per minute.	zinc chromate	zinc chromate	putty	MIL-P-8116			14-4	33 33
zinc chromate zinc chromate putty MilL-P-8116 Comment: Apply a thin coat of zinc chromate putty to mating surfaces of engine bay cable quadrant. No lubricant listed. Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables. Oil Comment: Oil leakage measured in drops per minute.	Comment: Apply of	a thin coat of z	inc chromate putty to	matting surface of c	ockpit throttle q	adrant assembly.		
a thin coat of zinc ch ate cable holes in pre oit kage measured in dra	zinc chromate	zinc chromate		MIL-P-8116		-	14-6	
ate cable holes in pre oil kage measured in dr	Comment: Apply	a thin coat of 2	inc chromate putty to	matting surfaces of	engine bay cabl	e quadrant.		
Comment: Lubricate cable holes in pressure seals when installing throttle quadrant cables. Oil Comment: Oil leakage measured in drops per minute.	No lubricant listed.						14-8	8
Oil leakage measured in drops per minute.	Comment: Lubrico	ate cable hole:	s in pressure seals whe	n installing throttle qu	adrant cables.			
Comment: Oil leakage measured in drops per minute.		To.					15-78	17
	Comment: Oil lea	kage measure	d in drops per minute.					
	*************	************		*****************	******			

Current Practice is to use:	Other "Suitable Substitutes":	Type of Operation lubrication	Crew Size	Quantity Time	Time	Indiv Risk
		servicing				
		lubrication				
		lubrication				
		lubrication				
		troubleshooting				

Page 16

Appendix C: Definitions

The following words, defined here (23:Appendix 2; 33), have been used throughout this document. They are summarized for the convenience of the reader.

AFMC Targeted Substances. AFMC targeted substances are the EPA-17 substances and isocyanate HMDI and trichlorotrifluoroethane.

Hazardous Material - Material that poses a threat to human health or the environment. Hazardous material is typically toxic, corrosive, ignitable, explosive, or chemically reactive.

Integrated Product Team (IPT) - A team established to network functional requirements and deliver integrated program guidance, strategies and solutions.

Life Cycle Costs (of Hazardous Material) - Direct and indirect costs attributable to hazmats during the life of the system, including acquisition, manufacture, supply, use, storage, inventory control, treatment, handling, transportation, recycling, emission control, training, emergency response, work place safety, labeling, hazard assessments, engineering control, personal protective equipment, medical monitoring, regulatory overhead, spill contingency, disposal, remedial action, and liability.

Materials Engineering Section - The organization established in San Antonio Air Logistics Center, Directorate of Technology and Industrial Support, to provide engineering and technical support to the F-5 Pollution Prevention IPT. The office symbol is SA-ALC/TIESM.

Ozone Depleting Chemicals - Chemicals that, when released into the atmosphere, result in the destruction of the earth's stratospheric ozone layer. They include Chlorofluorocarbons (CFCs), halons, and other substances as classified by the Clean Air Act of 1990. The term is synonymous with the legal term ODS (Ozone Depleting Substance) and a previously used term OLDS (Ozone Layer Depleting Substance). There is a good discussion of ODCs and how they destroy the ozone in Chapter 6 of Acquisition Pollution Prevention: AFMC Implementation Guide (21:29-33)

Pollution Prevention - Any practice which reduces the amount of any hazardous materials (including radioactive) entering any waste stream or otherwise released into the environment prior to end-of-pipe recycling, treatment, or disposal; and

reduces the hazards to public health and the environment associated with the release of such substances, pollutants or contaminants.

Pollution Prevention Technical Support Division - The organization established in HQ AFMC, Directorate of Engineering and Technical Management, to provide engineering and technical support to the AFMC Pollution Prevention IPT. The office symbol is HQ AFMC/ENX.

Substitute - Any chemical or process used to eliminate the need for an ODC or hazardous material. Also referred to in this document as an alternate.

Toxic Chemical - Any substance listed in Section 313 of the Superfund Amendment and Reauthorization Act of 1986.

Volatile Organic Compounds - Organic substances that react rapidly with nitrous oxides in air and in the presence of sunlight to form oxidants (smog).

Waste Minimization - The reduction of the quantity or toxicity of a residual waste that is generated and subsequently processed, stored, or disposed; its reduction minimizes present and future threats to human health and the environment.

Appendix D: Acronyms

The following acronyms (23:Appendix 2) have been used throughout this document. They are summarized here for the convenience of the reader.

AF - Air Force

AFB - Air Force Base

AFCEE - Air Force Center for Environmental Excellence

AFIT - Air I ree Institute of Technology

AFLC - Air Force Logistics Command. The primary supporting command. Consolidated with Air Force Systems Command into Air Force Materiel Command. The headquarters was located at Wright-Patterson AFB, Ohio.

AFMC - Air Force Materiel Command. The command with "cradle-to-grave" responsibility for Air Force weapons systems. The result of the consolidation of Air Force Systems Command and Air Force Logistics Command. The headquarters is located at Wright-Patterson AFB, Ohio.

AFSC - Air Force Systems Command. The command responsible for the initial acquisition of Air Force weapons systems. Consolidated with Air Force Logistics Command into Air Force Materiel Command. The headquarters was located at Andrews AFB, Virginia.

ALC - Air Logistics Center

ASC - Aeronautical Systems Center. Formerly Aeronautical Systems Division. Renamed upon the consolidation of Air Force Systems Command and Air Force Logistics Command into Air Force Materiel Command. Responsible for all weapon system acquisition and development. Primarily located at Wright-Patterson AFB, Ohio, with a geographically separated organization at Eglin AFB, Florida.

ASD - Aeronautical Systems Division. See ASC.

CFC - Chlorofluorocarbon.

DoD - Department of Defense.

EPA - Environmental Protection Agency.

EPC. Environmental Protection Committee.

HAZMAT - A commonly used abbreviation for hazardous material. Material that poses a threat to human health or the environment. Hazardous material is typically toxic, corrosive, ignitable, explosive, or chemically reactive.

HSC - Human Systems Center. Formerly Human Systems Division. Renamed upon the consolidation of Air Force Systems Command and Air Force Logistics Command into Air Force Material Command. Responsible for human systems integration and all human related issues for the Air Force. Primarily located at Brooks AFB, Texas, with geographically separated organizations at Wright-Patterson AFB, Ohio.

HSD - Human Systems Division. See HSC.

HQ - Headquarters.

IPD - Integrated Product Development.

IPT - Integrated Product Team. A team established to network functional requirements and deliver integrated program guidance, strategies and solutions.

OCR - Office of Collateral Responsibility.

ODC - Ozone Depleting Chemical. Chemicals that, when released into the atmosphere, result in the destruction of the earth's stratospheric ozone layer. They include Chlorofluorocarbons (CFCs), halons, and other substances as classified by the Clean Air Act of 1990. The term is synonymous with the legal term ODS (Ozone Depleting Substance) and a previously used term OLDS (Ozone Layer Depleting Substance).

OLDS - Ozone Layer Depleting Substance. See ODCs.

OPR - Office of Primary Responsibility

PPM - Pollution Prevention Management.

PPP - Pollution Prevention Program.

SAB - Scientific Advisory Board

SP() - System Program Office

TO - Technical Order

TORP - Technical Order Review Program

USAF - United States Air Force.

V()C - Volatile Organic Compounds. Organic substances that react rapidly with nitrous oxides in air and in the presence of sunlight to form oxidants (smog).

Bibliography

- 1. Alm, Alvin L. "Environmental and Technological Innovation," *Environmental Science and Technology*, 26: 1300 (July 1992).
- 2. ----. "Pollution Prevention and TQM," Environmental Science and Technology, 26: 452 (March 1992).
- 3. ----. "U.S. Retreat at the Earth Summit," Environmental Science and Technology, 26: 1503 (August 1992).
- 4. Anamosa, Nga T. "Hazardous Materials Management: A Needed Component in Lifecycle Anlysis." *Journal of the Society of Logistics Engineers*, 27(2): 6-8 (Summer 1993).
- 5. Andrews, Cathy. "The Logistics of Pollution Prevention: Life Cycle and Total Quality Management." Journal of the Society of Logistics Engineers, 27(2): 32-35 (Summer 1993).
- 6. Andrews, Julia. "Cut, Cap, and Date Updates." Environment, 35(4): 22-23 (May 1993).
- 7. Anderson, Brig Gen George K. Correspondence. Subject: HSC/EMP Acquisition Pollution Prevention Support Initiatives. Brooks AFB TX: HQ HSC/EMP, 22 June 1993.
- 8. Baca, Thomas E. "DoD Environmental Requirements and Priorities." Federal Facilities Environmental Journal, 3: 333-343 (Autumn 1992).
- 9. Baker, Sue. "Those Paint-Eating Scumbugs...and the Air Force that Loves Them." Leading Edge, 34(2): 24 (February 1992)
- 10. Begley, Sharon and others. "And Now, the Road From Rio," Newsweek, 46: (22 June 1992).
- 11. Blanchard, E. P. Jr. "The New Industrial Revolution: Can We Protect the Earth as Poor Countries Industrialize?" *Environmental Science and Technology*, 26: 869-870 (May 1992).
- 12. Carpenter, Betsy and Tim Zimmermann. "Spying on the Earth," U.S. News & World Report, 66-67 (29 June 1992).

- 13. Chechile, Richard A. and Susan Carlisle, Editors. Environmental Decision Making: A Multidisciplinary Perspective. New York: Van Nostrand Reinhold, 1991.
- 14. Clewell, Lt Col Harvey. "Integrated Weapons System Management of Hazardous Materials". Unpublished paper. HQ ASD/SEH, Wright-Patterson AFB OH 1988.
- 15. Cohrssen, John J. and Vincent T. Covello. Risk Analysis: A Guide to Principles and Methods for Analyzing Health and Environmental Risks. Washington: GPO, 1989 (PB 89-137772).
- 16. Defense Institute of Security Assistance Management. The Management of Security Assistance (Twelvth Edition). Washington: GPO, 1992.
- 17. Department of the Air Force. Acquisition Pollution Prevention: AFMC Implementation Guide. Wright-Patterson AFB: HQ AFMC Pollution Prevention Process Action Team, 26 May 1993.
- 18. Department of the Air Force. The Acquisition Pollution Prevention Monitor. Brooks AFB TX: HQ HSC/EMP, June 1993.
- 19. Department of the Air Force. AFMC Pollution Prevention Management Plan. Wright-Patterson AFB: HQ AFMC/CEVV, 1 June 1993.
- 20. Department of the Air Force. Air Force Ban on Purchases of Ozone Depleting Chemicals Action Memorandum, Washington: SAF, 7 January 1993.
- 21. Department of the Air Force. ASC Hazardous Material Elimination Plan (Draft). Wright-Patterson AFB: HQ ASC/EM, 19 July 1993.
- 22. Department of the Air Force. Environmental Leadership. AFMCR 500-13, 19 March 1993.
- 23. Department of the Air Force. Interim Air Force Contracting Policy for Elimination of Class I Ozone Depleting Substances. Washington: SAF, 26 May 1993.
- 24. Department of the Air Force. List of Applicable Publications: F-5E/F Aircraft and Equipment. T.O. 1F-5E-01. San Antonio ALC/MMEDT, Kelly AFB TX, 15 Sep 88.
- 25. Department of the Air Force. Pollution Prevention Program. AFR 19-4 (Draft), Washington: SAF, 1991.

- 26. Department of the Air Force. Pollution Prevention Program Action Memorandum. Washington: SAF, 7 January 1993.
- 27. Department of the Air Force. Reduction in the Use of Chlorofluorocarbons, Halons, and Other Substances that Deplete Stratospheric Ozone. AFR 19-15. Washington: HQ USAF, 1991.
- 28. Department of the Air Force. Security Assistance Technical Order Program. T.O. 00-5-19. Secretary of the Air Force, 15 September 1990.
- 29. Department of the Air Force. Directorate of Environmental Quality (HQ USAF/CEV). US Air Force: Commander's Guide to Environmental Quality. Washington: GPO, August 1991.
- 30. Department of Defense. DoD's War on Hazardous Waste: Measuring Hazardous Waste Reduction. Report PL907R2. Bethesda MD: Logistics Management Institute, 1991.
- 31. Department of Defense. DoD's War on Hazardous Waste: Volume 2: An Indexing System for Measuring Hazardous Waste Reduction. Report PL907R3. Bethesda MD: Logistics Management Institute, 1991.
- 33. Department of Defense. Elimination of Ozone-Depleting Substances. Washington: SAF, 21 May 93.
- 33. Department of Defense. Hazardous Material Pollution Prevention. DoDD 4210.15. Washington: HQ USAF, 27 July 1989.
- 34. Department of Defense. Security Assistance Management Manual. DOD 5105.38-M. Washington: Defense Security Assistance Agency, 1 Mar 1991.
- 35. Department of Defense. "System Safety, Health Hazards, and Environmental Impact", DoDI 5000.2, Part 6, Section I. Washington: HQ USAF, 23 February 1991.
- 36. Drawbaugh, Lt Col Richard. "What is Management of Hazardous Materials?," Oral presentation at the IEEE National Aerospace and Electronics Conference. Dayton: NAECON 1992.
- 37. Easterbrook, Gregg. "A House of Cards," Newsweek, 24-35 (1 June 1992).
- 38. ----. "Why Rio Will Make History," Newsweek, 33 (15 June 1992).

- 39. Evers, Ken H and Robert F. Bachert. "The IDEAL Modeling Methodology: Capabilities and Applications," Presented at SOAR 87, First Annual Workshop on Space Operations, Automation & Robotics, NASA/USAF, Houston TX, August 1987.
- 40. Fishbein, Bette K. "European Packaging Initiatives: Leading the Way on Source Reduction." Resource Recycling, March 1992.
- 41. Freeman, Harry, and others. "Industrial Pollution Prevention: A Critical Review," Journal of the Air and Waste Management Association, 42: 617-656 (May 1992).
- 42. Green Manufacturing. Brochure for the University of Dayton Conference for Executives and Decision Makers, 3-4 Dec 91.
- 43. Haas, Peter M. et al. "Appraising the Earth Summit." Environment, 34: 6-33 (October 1992).
- 44. Harwell, Mark A., William Cooper, and Robert Flaak. "Prioritizing Ecological and Human Welfare Risks from Environmental Stresses," *Environmental Management*, 16: 451-464 (July/August 1992).
- 45. Hay Systems Inc., Advanced Technologies Inc., and Ackman Associates Inc. Manpower, Personnel, Training, and Safety (MPTS) in The Weapon System Acquisition Process. Contract F 49642-88-D003/5006/HAY. August, 1989.
- 46. Henn, Carl L. "Environmental Economics 101." Journal of the Society of Logistics Engineers, 27: 4-5 (Summer 1993).
- 47. ----. "Tidal Waves of Change." Journal of the Society of Logistics Engineers, 27: 15-19 (Summer 1993).
- 48. Hume, C.D. and J.A. Long. Hazardous Materials Management Life Cycle Cost Model User's Guide, Version 2.20. Contract F33657-90-D-0050. Brooks AFB TX: HQ HSC/PP, 2 April 1993.
- 49. Kavianian, Hamid R. and Wentz, Jr., Charles A.. Occupational and Environmental Safety Engineering and Management. New York: Van Nostrand Reinhold, 1990.
- 50. Koren, Herman. Handbook of Environmental Health and Safety Principles and Practices, Volume I (Second Edition). Chelsea MI: Lewis Publishers, Inc., 1991.

- 51. ---- Handbook of Environmental Health and Safety Principles and Practices, Volume II (Second Edition). Chelsea MI: Lewis Publishers, Inc., 1991.
- 52. Laznow, Joseph. "Stratospheric Ozone Depletion: The CFC Phaseout," HAZMAT World, 40-45 (June 1992).
- 53. Lippmann, Morton. Environmental Toxicants: Human Exposures and Their Health Effects. Foreword by David P. Rall. New York: Van Nostrand Reinhold, 1992.
- 54. "Los Alamos LIDAR Research Demonstrates Military, Civil Uses." Aviation Week & Space Technology, 57-58 (7 December 1992).
- 55. MacDonald L. Kay. "Satellites: A Tool for Environmental Logistics Planning." Journal of the Society of Logistics Engineers, 27: 9-14 (Summer 1993).
- 56. Mandula, Barbara B., and David E. Blockstein. "Federal Funding for Environmental Research," Environmental Science and Technology, 26: 1497-1502 (Augusts 1992).
- 57. McCarty, Maj Brian D. "Hazardous Material Minimization in the U.S. Department of Defense Acquisition Process: Air Force Systems Command Perspective." *Report* from the Hazardous Materials Management Task Force. HQ Human Systems Division, Brooks AFB TX, 1991.
- 58. ----. "Hazardous Material (HAZMAT) Data Bases in the Acquisition Process," Oral presentation at the IEEE National Aerospace and Electronics Conference, Dayton: NAECON 1992.
- 59. Millan, Stanley. "The BAT Stops Here: Internal Environmental Law Compliance." Federal Facilities Environmental Journal. 3: 131-138 (Summer 1992).
- 60. MITRE Corporation, The. "Acquisition Management of Hazardous Materials, The, Part II, Identification and Evaluation Process, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.
- 61. MITRE Corporation, The. "The Acquisition Management of Hazardous Materials, Part IV, Training Strategy, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.
- MITRE Corporation, The. "The Acquisition Management of Hazardous Materials, Part VII, Curriculum Materials for a One-Hour Introductory Course, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.

- 63. MITRE Corporation, The. "The Acquisition Management of Hazardous Materials, Part VIII, Curriculum Materials for a One-Day Orientation Course, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.
- 64. MITRE Corporation, The. "The Acquisition Management of Hazardous Materials, Part X, Functional Requirements for a Hazardous Material Data Repository, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.
- 65. MITRE Corporation, The. "The Acquisition Management of Hazardous Materials, Part XI, Data Content Requirements for Acquisition Management of Hazardous Materials, Final Report." Contract No. F33616-87-D-4015. McLean VA. August 1992.
- 66. MITRE Corporation, The. "The Acquisition Management of Hazardous Materials Technical Integration Plan," Draft Report, McLean VA. 7 August 1991.
- 67. MITRE Corporation, The. "Contractual Language and Tailoring Guidance for Acquisition Management of Hazardous Materials (AMHM)," Draft Report, McLean VA. 9 September 1991.
- 68. Morehouse, Jr., Maj Thomas. "Air Force Pollution Prevention: Reduced Dependence on Hazardous Material," Unpublished Conference Paper presented at the IEEE National Aerospace and Electronics Conference NAECON 1992., Dayton OH, (21 May 1992).
- 69. ----. "Protecting the Environment: A Legitimate National Defense Role and a Creative Budget Strategy for the Nineties," Air Force Journal of Logistics, Winter 1991.
- 70. Nemerow, Nelson L. and Avijit Dasgupta. Industrial and Hazardous Waste Treatment. New York: Van Nostrand Reinhold, 1991.
- 71. Nordwall, Bruce D. "Hughes Soldering Changes to Aid Environment, Cut Manufacturing Costs." Aviation Week & Space Technology, 45 (17 February 1992).
- 72. Northrop Corporation, Aircraft Division. F-5 E/F Description. NB 74-36, Revised November, 1982.
- 73. Nunno, Thomas et al. International Technologies for Hazardous Waste Site Cleanup. Park Ridge NJ: Noyes Data Corporation, 1990.

- 74. O'Brien, Joseph F. and Larry Cork. "Utilizing Life-cycle Cost Analysis for Optimizing Product Profitability and Environmental Safety." Journal of the Society of Logistics Engineers, 27: 28-31 (Summer 1993).
- 75. O'Dea. Katherine and Gregg Freeman, "Logistics and the Ultimate Pollution Prevention Process," SOLEtter, 28: (August 1993).
- 76. Otway, Harry and Detlof von Winterfeldt. "Expert Judgment in Risk Analysis and Management: Process, Context, and Pitfalls," *Risk Analysis*, 26: 83-93 (March 1992).
- 77. "Ozone Layer Depleting Substances (OLDS) Elimination Workshop", Minutes, Wright-Patterson AFB OH, 26-29 May 92.
- 78. Patrick, David R. "Clean Air Act Update," Environmental Management Review, 25: 98-108 (Third Quarter 1992).
- 79. Palmer, Elizabeth A. "Pollution Clogs the Transfer of Land to Civilian Uses." Congressional Quarterly: Defense & Foreign Policy. 770-772 (27 March 1993).
- 80. Pieth, Reto. "Toxic Military." The Nation, 773 (8 June 1992).
- 81. Pratt, Katherine. "Environmental Economics and Logistics Engineering." Logistics Spectrum, 27: 22-27 (Summer 1993).
- 82. Roy, Manik and Hillel Gray. "Toxics Use Reduction: The Critical Issues," *Pollution Prevention Review*, 181-188 (Spring 1992).
- 83. "SA-ALC uses nonhazardous, nontoxic cleaner on aircraft." Joint Depot Maintenance Circular, 28 June 1991.
- 84. Satchell, Michael. "The Mess We've Left Behind." U.S. News & World Report, 28-31 (30 November 1992).
- 85. Shulman, Seth. The Threat at Home: Confronting the Toxic Legacy of the U.S. Military. Boston: Beacon Press, 1992.
- 86. SofTech, Inc., Integrated Computer-Aided Manufacturing (ICAM) Function Modeling Manual (IDEFo), Contract F33615-78-C-5158. Wright-Patterson AFB OH: Materials Laboratory, AF Wright Aeronautical Laboratories, June 1981 (UM 110231100).

- 87. SofTech, Inc., "IPD/RFP Process Analysis," Phase I Results: Interim Report, Wright-Patterson AFB OH: ASC/CYX, 19 July 1991.
- 88. "Solvents and the Environment." United Nations Environment Programme: Industry and Environment. 14: 1-2 (October-November-December 1991).
- 89. Speth, James G. "On the Road to Rio and to Sustainability," Environmental Science Technology, 26: 1075-1076 (June 1992).
- 90. Spiegell, Jay and Barry Steinberg. "Contracting and the Environment," *National Defense*, 13-15 (January 1992).
- 91. Stephens, Eric L. "Pollution Prevention in New Weapon System Acquisition", Proceedings of the IEEE National Aerospace and Electronics Conference, 724-728. New York: IEEE Press, 1992.
- 92. Theodore, Louis and Young C. McGuinn. *Pollution Prevention*. New York: Van Nostrand Reinhold, 1992.
- 93. Tibbs, Hardin B.C. "Industrial Ecology--An Agenda for Environmental Management," *Pollution Prevention Review*, 167-180 (Spring 1992).
- 94. United States Congress. Clean Air Act, Amendments. Public Law No. 101-549. Washington: GPO, 15 November 1990.
- 95. United States Congress. Clean Water Act. 33 USC 1251. Washington: GPO, 1977.
- 96. United States Environmental Protection Agency. "Pollution Prevention Information Clearinghouse." EPA Brochure. Washington DC, May 1992.
- 97. United States Environmental Protection Agency. "Pollution Prevention Information Exchange System." EPA *Brochure*. Washington DC, May 1992.
- 98. United States Environmental Protection Agency. "The 33/50 Program: Forging an Alliance for Pollution Prevention." EPA *Brochure*. Washington DC, July 1991.
- 99. Van Mullem, Maj Douglas. "Pollution Prevention Acquisition Action Plan," Oral *Presentation* at the IEEE National Aerospace and Electronics Conference, Dayton: NAECON 1992.
- 100. Van Voorst, Bruce. "A Thousand Points of Blight." *Time*, 68-69 (9 November 1992).

- 101. Vest, Gary. Deputy Assistant Secretary of the Air Force for Environment, Safety and Occupational Health Address to AFIT students. Air Force Institute of Technology (AU), Wright-Patterson AFB OH, May 1992.
- 102. Wagner, Travis P. Hazardous Waste Identification and Classification Manual. New York: Van Nostrand Reinhold, 1990.
- 103. Wilson, Albert R. Environmental Risk: Identification and Management. Chelsea, MI: Lewis Publishers Inc., 1991.
- 104. Wold, Katy et al. "Chlorinated Solvents: Will the Alternatives be Safer?" Journal of the Air and Waste Management Association, 41(8): 1055-1061.

Janice M. Gavern was born on 24 April 1949 in Scranton, Pennsylvania. She graduated from South Scranton Central Catholic High School in 1967, and joined the Air Force in October of the same year. She spent four years as an enlisted personnel clerk. attaining the rank of sergeant. At the end of her enlistment she entered the Air Force Reserve. She worked for four years as a postal employee, began taking college classes at night, and continued working as a Air Force Reserve personnel clerk. In 1975 she crosstrained in the Reserves into the aircraft maintenance career field (C-130s), and in 1976 she became a reciprocating engine mechanic (C-123s). She attained the rank of technical sergeant. She began working for Aeronautical Systems Division in 1978 as a co-operative education student employee. In June, 1981 she graduated from Wright State University with a BS in Psychology, and became a full-time engineering psychologist. She worked for the Life Support System Program Office, and for Crew Station Design Facility, a flight similation applied research facility. She applied and was accepted for direct commissioning as an aircraft maintenance officer in the Reserves. She was commissioned a second lieutenant in July 1981. From 1981 until 1989, as the unit Weapons Safety Officer, she set up and managed the weapons safety program for the 906 Tactical Fighter Group (F-4s and F-16s) at Wright Patterson AFB, Ohio. In 1989, she became a category B reservist, assigned as an aircraft maintenance officer to San Antonio Air Logistics Center, Proven Aircraft Division. As a civil service employee, she became a manpower, personnel, and training analyst in the IMPACTS office. She worked for the Development Planning and Program Development Program Offices. In 1992 she was approved for long-term, full-time training at the Air Force Institute of Techonology (AFIT). She graduated from AFIT on 21 September 1993 with a Master of Science degree in Logistics Management, Acquisition Logistics specialty. She is currently a GS-13 in civil service, and a Captain in the Air Force Reserves. She is a member of the national and local

chapters of the Human Factors Society, and the Society of Logistics Engineers (SOLE), the local chapter of SAFE, and the Affiliate Societies Council in Dayton. Ms Gavern lives in Dayton, Ohio with her daughter, Lisa Goodman.

Permanent Address: 5340 Flamingo Court

Dayton, Ohio 45431-2828

Work Address:

ASC/ALLH, Bldg 52 2475 K Street, Suite 1

Wright-Patterson AFB, OH 45433-7642

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this follection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for information Operations and Peports, 1215 Jefferson Davis Hippyray, Suite 1204, Afrington, 74, 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE	AND DATES COVERED
	September 1993	Master's Th	esis
4. TITLE AND SUBTITLE ANALYSIS AND DEVELOPMENT O MANAGEMENT PROGRAM WITH RE SIMILAR PROGRAMS FOR OTHER 6. AUTHOR(S)	COMMENDATIONS FOR C		, 5. FUNDING NUMBERS
Janice M. Gavern, GS-13, C			
7. PERFORMING ORGANIZATION NAME	S) AND ADDRESS(ES)		8. PERFORMING ORGANIZATION REPORT NUMBER
Air Force Institute of Tec	hnology, WPAFB OH 4	5433-6583	AFIT/GLM/LSY/93S-19
9. SPONSORING/MONITORING AGENCY	NAME(S) AND ADDRESS(ES)		10. SPONSORING MONITORING AGENCY REPORT NUMBER
SA-ALC/LAV 303 Wilson Blvd Kelly AFB TX 78241-5443			
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STAT	EMENT		12b. DISTRIBUTION CODE
Approved for public releas	e; distribution un	limited	
13. ABSTRACT (Maximum 200 words)			
This study developed a pol and described its utility			

This study developed a pollution prevention management program for the F-5 aircraft, and described its utility and applicability as a generic framework for similar programs. A representative set of F-5 technical orders was analyzed by hand, and the identified chemicals, materials, and processes were loaded into a spreadsheet data base for additional analysis. The Environmental Protection Agency EPA 17 chemical list, and lists of ozone depleting chemicals (ODCs) were used as criteria to identify, for minimization, reduction, or elimination from use on the F-5, a hazardous material (hazmat) subset of those chemicals and materials which had already been identified. The identified hazmat substances were then "rolled-up" into an F-5 Pollution Prevention Management Plan. Program management use and implementation of the information set out in such a plan were also described. Recommendations for additional research and development, and for required tools were included. Finally, actual examples of all of the material created were attached to the document.

14. SUBJECT TERMS			15. NUMBER OF PAGES
Pollution Prevention,	hazardous materials, h	azmat, ODC, F-5,	152
aircraft, ozone deplet	ing chemicals, Securit	y Assistance, foreign	16. PRICE CODE
countries, allies, EPA	, maintenance		;
17. SECURITY CLASSIFICATION		19. SECURITY CLASSIFICATION	20. LIMITATION OF ABSTRACT
OF REPORT	OF THIS PAGE	OF ABSTRACT	
Unclassified	Unclassified	Unclassified	UL.

AFIT RESEARCH ASSESSMENT

• •			or current and future applications to: DEPARTMENT OF THE
AIR FORCE, AIR FORCE PATTERSON AFB OH 4		TECHNOLOGY/L	AC, 2950 P STREET, WRIGH
1. Did this research contr	ibute to a current res	search project?	
a. Ycs	b. N	o	
2. Do you believe this rescontracted) by your organ	•	-	it would have been researched (not researched it?
a. Yes	b. N	0	
had been done in-house.	npower and/or dollar	s if it had been acc	complished under contract or i
-	be important. Whe	ther or not you we	research, although the results are able to establish an equivalentificance?
a. Highly Significanı	b. Significant	c. Slightly Significant	d. Of No Significance
5. Comments			
	-		
Name and Grad	e	Organiz	zation
Position or Title	****	Address	······································